In Search of the Cause of Cycles

by Hans Hannula, Ph.D.

What Causes Cycles?

People have, for centuries, noticed cycles in many things, including the stock market. My own interest in cycles and their application to the market began in the early 1970's, when I read Dewey and Mandino's *Cycles, The Mysterious Forces That Trigger Events* [Dewey-1] and *The Profit Magic of Stock Transaction Timing* [Hurst]. Since then I have studied cycles and used them regularly in my trading. My greatest successes have been using them to call the 1982 and 1984 cycle bottoms. While cycles have been a practical tool for me, I have always been bothered by a lack of understanding of why they occur.

Dewey and Mandino pose what they call the imperative question, which has three parts:

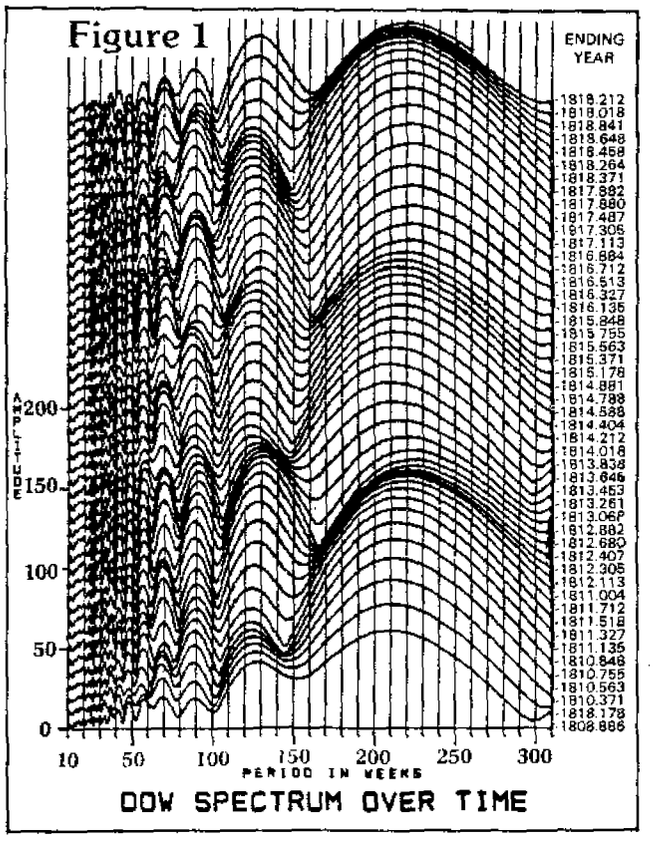
1. What is "out there" that causes cycles?
2. How do these external rhythmic forces get transmitted to earth?
3. What is the mechanism whereby human beings, plants, and animals area affected?

Recently, I uncovered significant pieces of the amazing answer to this question, pointing directly at the cause of these "mysterious forces." Many people, such as Peter Eliades, an investment advisor from Los Angeles, have suspected the answer. In response to a question about what causes cycles, he said, "I'm not real sure, and it sounds kind of freaky, but if pushed to the wall I'd have to say it has to do with astronomical configurations that affect behavior on a mass basis." [Newsweek]

What I have found is not at all "freaky," but direct scientific evidence that the planets are the cause of cycles. While space does not permit a complete explanation of all of my findings to date, I would like to explain the search that lead me to a time series, called the Master Clock, which is derived solely from an astrophysical model of planetary motion, and which shows a direct relationship to major market cycles.

The Search Begins

What enabled me to do cycle work at all was the advent of the personal computer. With this tool I have been able to program a comprehensive set of tools to do cyclic analysis. Among the first tools was a Fast Fourier Transform (FFT) program [Glass], which was used to produce Figure 1, showing the frequency spectrum of the Dow Jones Industrial Average over time. This plot is the result of 46 different FFT runs at approximately .2 year intervals covering 20 years of market history. To see the relationships of these spectra over time, Figure 1 shifts each run upward a bit, showing a "stack" of plots. Thus, the lefthand amplitude scale, which labels the bottom plot, should be thought of as shifting upward as well, as the plots stack.



From this plot, it is quite obvious that there are strong cycles in the Dow, with peaks near 208 weeks, 124 weeks, 89 weeks, etc. Further, these cycles are persistent. If one looks "up the valleys" on this plot, some cycle drift can be seen, but the peaks remain quite stable. Other plots were run covering the first 85 years of this century, and they are similar.

*First published in the March 1987 issue of *Technical Analysis of Stocks and commodities*. This article includes additional material related to research conducted by the Foundation pp. 164 and 165.

Digital Filters Help—and Hurt

With cyclic behavior established, I attacked the task of separating out individual cycles, using the technique of digital filtering [Hurst][Hamming]. (Readers unfamiliar with digital filtering should refer to the break out on page 165. **"How Digital Filters Work."**) **With programs to design, test, and run digital filters, I thought I had it made, until I discovered two limitations of digital filters. Figure 2** illustrates the first of these limitations. To get a very selective filter requires a lot more filter weights than a less selective filter. The filter using 999 points is considerably more selective at filtering out the 124 week cycle than the filter using just 333 points.

Table 1

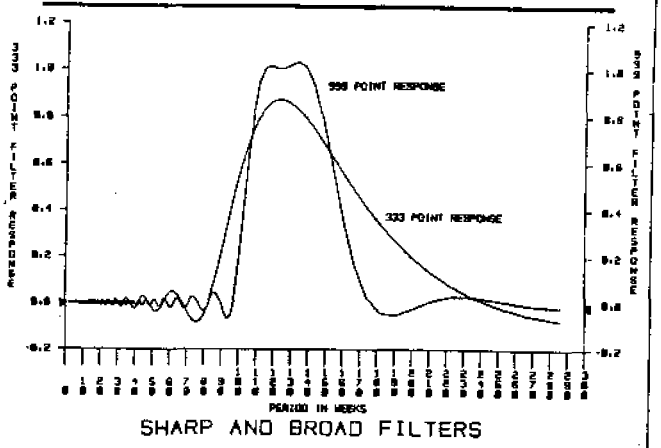
TEST PERIOD = 208 WEEKS

COL ROW		SYNODIC 1	YEARS 2	WEEKS 3	RATIO 4	EXACT RATIO 5	EXACT WEEKS 6
1	M		0.24085	12.56742	16.55072	16.500	207.363
2	V		0.61521	32.10133	6.47948	6.500	208.659
3	E		1.00004	52.18156	3.98608	4.000	208.726
4	J		11.86223	618.9649	0.33604	0.333	206.115
5	MV			20.65286	10.07124	10.000	206.529
6	ME			16.55439	12.56464	12.500	206.930
7	MJ			12.82788	16.21468	16.250	208.453
8	VE			83.42026	2.49340	2.500	208.551
9	VJ			33.85727	6.14344	6.250	211.608
10	EJ			56.98572	3.65004	3.667	208.967
11	M(VE)			14.79655	14.05732	14.000	207.152
12	M(VJ)			19.98599	10.40729	10.500	209.851
13	M(EJ)			16.12317	12.90068	13.000	209.601
14	V(ME)			34.18152	6.08516	6.000	205.089
15	V(MJ)			21.36577	9.73520	9.750	208.316
16	V(EJ)			70.51268	2.82944	2.750	202.140
17	E(MV)			34.18152	6.08516	6.000	205.089
18	E(MJ)			17.00931	12.22860	12.250	208.364
19	E(VJ)			96.41440	2.15735	2.250	216.932
20	J(MV)			21.36577	9.73520	9.750	208.316
21	J(ME)			17.00931	12.22860	12.250	208.364
22	J(VE)			96.41440	2.15735	2.250	216.932
23	(MV) (ME)			83.42026	2.49340	2.500	208.551
24	(MV) (MJ)			33.85727	6.14344	6.000	203.144
29	(MV) (VE)			27.44844	7.57784	7.500	205.863
26	(MV) (VJ)			52.95578	3.92781	4.000	211.823
27	(MV) (EJ)			32.39267	6.42120	6.500	210.552
28	(ME) (MJ)			56.98572	3.65004	3.667	208.967
29	(ME) (VE)			20.65286	10.07124	10.000	206.529
30	(ME) (VJ)			32.39267	6.42120	6.500	210.552
31	(ME) (EJ)			23.33250	8.91460	9.000	209.593
32	(MJ) (VE)			15.15893	13.72128	13.750	208.435
33	(MJ) (VJ)			20.65286	10.07124	10.000	206.529
34	(MJ) (EJ)			16.55439	12.56464	12.500	206.930
35	(VE) (VJ)			56.98572	3.65004	3.667	208.967
36	(VE) (EJ)			179.8315	1.15664	1.250	224.789
37	(VJ) (EJ)			83.42026	2.49340	2.500	208.551

So why not just use lots of points and very selective filters? The reason is that the filter's output is delayed by one half the number of data points used in the calculation. A filter is simply a specially weighted moving average, whose result should be plotted in the center of the data covered. So the 999 point, highly selective filter will have its most recent output 500 weeks (9.6 years) before the last data point. So what one is forced to do is to trade off selectivity for delay.

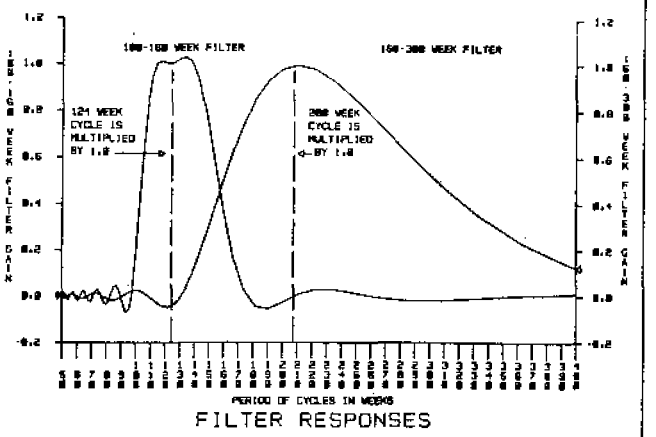
But good results can be obtained. Figure 3 shows the response curves of two overlapping filters used to extract the 124 and 208 week cycles from the Dow. The lower filter multiplies the 124 week cycle by 1.0, the 100 week and 160 week cycles by only .5, and cycles below 90 weeks and above 170 weeks by less than .05. This effectively selects cycles in the 100–160 week range. The upper filter multiplies the 208 week cycle by 1.0, the 160 and 300 week cycles by .5, and

Figure 2



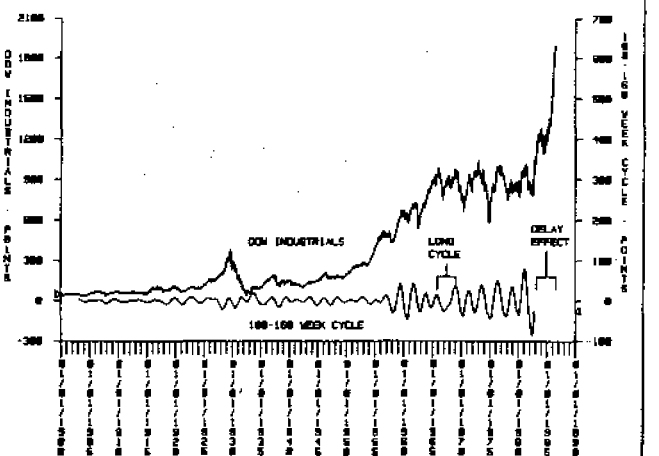
SHARP AND BROAD FILTERS

Figure 3



FILTER RESPONSES

Figure 4



DOW VERSUS 100-160 WEEK CYCLE

cycles above 350 and below 140 weeks by less than .2 . This effectively selects cycles in the 160–300 week range.

These filters were run with the Dow as the input data, with the output of the computer runs being the Dow's cyclic components in the range 100–160 weeks (containing the 124 week cycle) and 160–300 weeks (containing the 208 week cycle). The filtered cycles are shown in Figures 4 and 5, plotted below the Dow. The corresponding peaks and valleys can be seen. Also note that the amplitude changes of the 100–160 week cycle is most recently 90 or more Dow points, while the 160–300 week amplitude change is as much as 170 Dow points. These sizable moves are important to both traders and investors.

If one looks carefully at Figures 4 and 5, the delay effect can also be seen. Both filters have their last output in late 1982, although data runs into 1986.

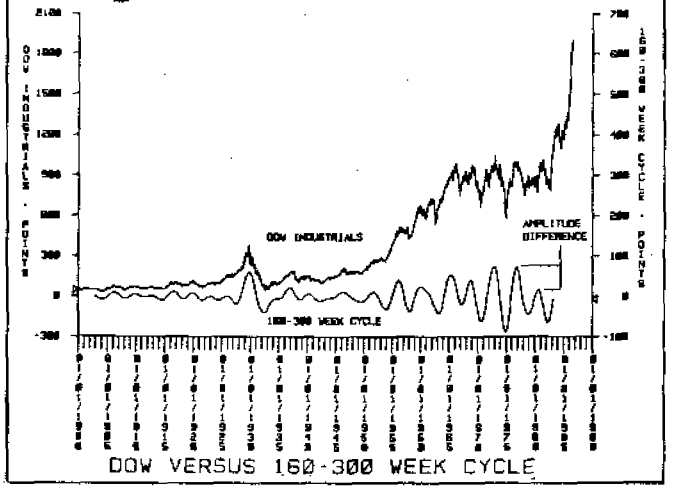
Curse Those Variable Cycles

Figures 4 and 5 also show why cycles have gone in and out of vogue as a market tool. The real cycles are not constant amplitude or even constant frequency. Rather, they fade in and out, always returning to the basic pattern, but frequently disappearing just when a trader has decided to bet on one.

Notice, for example, the difference in amplitude in the 1977 and 1981 peaks of the 160–300 week component in Figure 5. The cycle ending in 1977 accounted for about 170 Dow points, and the very next one accounted for only 80 points. Any technician expecting this cycle to be 170 points stood to loose a lot of money.

Also note the extra long 1965–1969 cycle in the 100–160 week component in Figure 4. The cycle, which had been very consistent in duration, suddenly nearly doubled in length. Again, technicians counting on constant cycles could have lost a lot.

Figure 5



DOW VERSUS 160-300 WEEK CYCLE

This variability has caused not only a disenchantment, but a debate about whether cycles really exist or are the artifact of the analysis techniques themselves. Believers, like myself, worked to develop ways to cope with the variabilities and the filter delays, with reasonable success. But all of these techniques were merely enhancements to the basic spectrum analysis and digital filtering techniques. What was really called for was a different approach.

A Brand New Approach

My thinking got jolted one day in 1975 when I ran into an ex-teacher of mine at lunch. I found that his main interest was in the cycles in the Consumer Price Index (CPI). He had a theory of how the motion of the planets could physically affect the earth, and was having great success extracting known planetary periods from the CPI. The astounding thing was that he was extracting these periods with five decimal place accuracy, using techniques that gave statistical correlation coefficients of .9999 or better(1.0 represents absolute certainty).

The possibility that planetary positions could affect the markets is not new. W. D. Gann [Gann], Foster [Foster], Bradley [Bradley], Jensen [Jensen], LCDR Williams [Williams] and others have all used various forms of planetary configurations to interpret and predict market behavior.

My interest was really peaked when I found my friend, with his scientific background talking about a scientific approach to studying the effect of planets on earthly cycles. The basic theory is that the planets, as they orbit the sun, cause a stirring effect in the mass of gasses that make up the sun. This is caused by each planet pulling the part of the sun nearest it just slightly, distorting the shape of the mass. These distortions cause movements in the gasses, which affect the amount of radiation given off by the sun. This radiation, in various forms, travels from the sun to the planets. One form, the particles making up the solar wind, travel in paths that are steered by the planets. This solar variation in radiation causes a variety of changes in the earth's environment, such as heating effects, electromagnetic effects, various weather changes [McCormac], etc. These environmental changes in turn cause changes in human behavior, which should be most detectable in data that reflect mass behavior, such as the CPI and the markets.

Particular planetary configurations are significant in this theory. When two planets are on opposite sides of the sun, they stretch it into an elongated form. This is called opposition. When two planets are in line on the same side of the sun, their forces combine to distort the sun toward them. This is called conjunction. When two planets are at ninety degrees to each other, they distort the sun into an unbalanced triangle. This is called quadrature. These configurations are shown graphically in Figure 6. As the planets rotate, these configurations recur at regular intervals, leading to a whole variety of planetary cycles. These subtle dis-

tortions cause tidal waves in the sun's gasses, just as the moon's pull causes waves in earth's oceans.

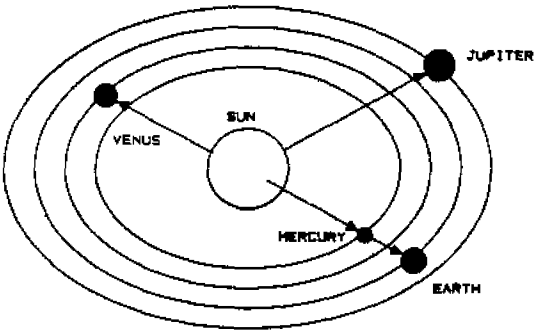


Figure 6

PLANETARY CONFIGURATIONS
VENUS-MERCURY OPPOSITION, MERCURY-EARTH CONJUNCTION, JUPITER-VENUS QUADRATURE, ETC.

What excited me about the Solar Eagle's* theory, was that these effects should all be measurable and scientifically verifiable. I revisited my Dow spectrum (Figure 1) with a view toward analyzing it to see if planetary forces could be involved. The basic approach is to compute all the cycles the planets *could* make, and then look for relationships between them and the market cycles. Table 1 shows a spreadsheet for testing the various planetary synodic** periods versus the 208 week Dow cycle. For simplicity, only four planets are used: Mercury (M), Venus (V), Earth (E), and Jupiter (J). The first four rows of the spread sheet show their basic periods. Synodic periods are shown in rows 5 through 10. Complex synodic periods are shown in the rows 11–37. The notation M(VE) means the complex synodic period formed by the period of Mercury and the synodic of Venus and Earth. Column 3 gives these planetary periods in weeks.

What we are looking for here is to find some direct integer (whole number) relationship between an earthly cycle, such as the Dow 208 week cycle, and the planetary cycles. For example, if a planetary cyle of 104 weeks existed, exactly two of them would occur during an earthly 208 week cycle, providing evidence that the two were possibly related.

*Solar Eagle is what my friend calls himself. He is a retired Air Force pilot, as well as a teacher and scientist.

**A synodic period is one made up by the motion of two or more planets. As one planet orbits, another faster planet catches and passes it in one synodic period. More complex synodic periods come when one planet passes another while it is itself being passed by a third planet. Synodic periods thus give the period between the recurrences of particular planetary configurations. The synodic period of two planets with periods A and B may be computed by:

$$S = \frac{A \times B}{(A - B)}$$

To look for these possible relationships, Column 4 gives the trial period of 208 weeks divided by the planetary synodic periods from column 3. What is important here is to look at the fractions. A fraction of .3333, for example, would indicate that three of that planetary cycle would coincide exactly with one cycle of the earthly event, so might be directly related to it. The more such relationships between the earthly cycle and the planetary cycles that are found, the more likey it is that the planetary cycles could actually be causing the earthly cycle. If no, or only a few such nice relationships are found, there is little possibility of a cause and effect.

For those cases where a fraction is near one that would indicate a nice relationship (such as .000, .2500, .333, .5000, etc.), a minor adjustment can be made to find out what the exact planetary cycle is which might be showing up as an approximate earthly cycle. These adjustments are entered manually after column 4 is inspected. Column 5 is this nearest ideal ratio. Column 6 is this ideal ratio multiplied by the synodic period from column 3. This gives the exact planetary cycles that could be causing a nominal 208 week cycle in the markets. For example, row 8 shows that 2.5 Venus-Earth synodic periods take 208.551 weeks, very close to the nominal 208 week Dow peak.

Examination of column six shows that practically all of the possible synodic periods of Mercury, Venus, Jupiter, and Earth are related and could be causing a nominal 208 week cycle on Earth. It does not prove that the cause and effect is really there, but it strongly supports the case that it is *possible.*

Table 2

TEST PERIOD = 124 WEEKS

COL RON	SYNODIC 1	YEARS 2	WEEKS 3	RATIO 4	EXACT RATIO 5	EXACT WEEKS 6
1	M	0.2408406	12.56693	9.86716	10.000	125.669
2	V	0.6151811	32.09982	3.86295	3.750	120.374
3	E	1	52.17948	2.37641	2.333	121.752
4	J	11.86186	618.9456	0.20034	0.200	123.789
5	MV		20.65216	6.00421	6.000	123.913
6	ME		16.55375	7.49075	7.500	124.153
7	MJ		12.82738	9.66682	9.667	123.998
8	VE		83.41541	1.48654	1.500	125.123
9	VJ		33.85565	3.66261	3.667	124.137
10	EJ		56.98339	2.17607	2.250	128.213
11	M(VE)		14.79603	8.38063	8.500	125.766
12	M(VJ)		19.96532	6.20455	6.250	124.908
13	M(EJ)		16.12255	7.68108	7.750	124.950
14	V(ME)		34.18049	3.62780	3.667	125.328
15	V(MJ)		21.36504	5.80387	5.750	122.849
16	V(EJ)		73.50864	1.68688	1.667	122.514
17	E(MV)		34.18049	3.62780	3.667	125.328
18	E(MJ)		17.00865	7.29041	7.333	124.730
19	E(VJ)		96.40839	1.28820	1.250	120.510
20	J(MV)		21.36504	5.80387	5.750	122.849
21	J(ME)		17.00865	7.29041	7.333	124.730
22	J(VE)		96.40839	1.28820	1.250	120.510
23	(MV)(ME)		83.41541	1.48654	1.500	125.123
24	(MV)(MJ)		33.85565	3.66261	3.667	124.137
25	(MV)(VE)		27.44773	4.51768	4.500	123.515
26	(MV)(VJ)		52.95514	3.34160	3.333	123.562
27	(MV)(EJ)		32.39170	3.82814	3.750	121.469
28	(ME)(MJ)		86.98339	2.17607	2.250	128.213
29	(ME)(VE)		20.65216	6.00421	6.000	123.913
30	(ME)(VJ)		32.39170	3.82814	3.750	121.469
31	(ME)(EJ)		23.23161	5.31468	5.333	124.435
32	(MJ)(VE)		15.15639	8.18029	8.250	125.057
33	(MJ)(VJ)		20.65214	6.00421	6.000	123.913
34	(MJ)(EJ)		16.55375	7.49075	7.500	124.153
35	(VE)(VJ)		56.98339	2.17607	2.250	128.213
36	(VE)(EJ)		179.8308	0.68954	0.667	119.887
37	(VJ)(EJ)		83.41541	1.48654	1.500	125.123

Study of Table 1 and Table 2, which shows the 124 week results, gives strong evidence that there are many nearby planetary cycles that could contribute to the 208 and 124 week Dow spectrum peaks. Similar analysis on the other spectral peaks give similar results. Very clearly, the Dow spectrum has a very solid association with the planetary periods. Any trader not aware of these relationships could be at risk.

The frightening thing is, however, that there are so many planetary cycles involved. *What is really "out there" are not single cycles, but whole families of them, slipping by each other slowly, sometimes adding in phase to make a powerful cycle, sometimes canceling each other to make the cycle disappear, just to keep us mortals guessing.* That is the explanation for why, in Figure 1, the spectral peaks are so broad.

An Astrophysical Computer Model

In trying to deal with this complexity, I finally recognized that one limitation of the approach was that it was an indirect technique. It was based on trying to draw conclusions from the data itself. I proposed to my mentor the possibility of using a more direct approach, actually building a computerized model of the solar system. With his encouragement I began to build one.

The first part of the model is to calculate the planet's positions. This is possible if one knows certain constants, and what time and date it is. Then, the various astrophysical forces, such as the gravitational pull on the sun, can be programmed. These forces can then be computed over any time period, giving a graph of the force. With such a model, the forces may be individually computed and examined for affects on another time series, such as the Dow. Since the only variable input to this model is time, it is good for past, present, or future. Any relationships to a market discovered can then be used for predicting future market moves.

Many, many forces have been analyzed and compared, looking for direct linkage to market action. Finally, one emerged which worked well. It is the sum of all the planetary stirring forces, computed by

$$F = \frac{KM}{R^3}$$

where K is an arbitrary constant to adjust for units of measure, M is the mass of the planet, and R is the distance it is from the sun. The equation is derived directly from the law of gravitational attraction found in any college physics book.

At first, this force seemed to have no relationship to the Dow, so various moving average filters were tried. There was a particularly strong cycle of about 1.6 years that I tried to smooth out. It frustrated repeated efforts to do so. For some time I considered it a "royal pain". But it is now called the Master Clock for reasons which will become clear. It's value became apparent one day when I happened to plot the stirring force, filtered successively by 125, 33, and 13 week moving averages, versus the Dow 160–300 week data. This is shown in Figure 7.

The Master Clock as a Synchronizer

Examination of Figure 7 shows something rather astounding. The Dow 160–300 week cycle (top trace) has peaks and valleys that synchronize, even when they slip, with the Master Clock (bottom trace). The triangles mark these "lock in" points. Figure 8 shows the same effect for the Dow 100–160 week cycle, although there are two points (circles) that did not lock in.

This suggests that the following is occurring: Things on earth behave as normal dynamic systems, having a "natural

Figure 7

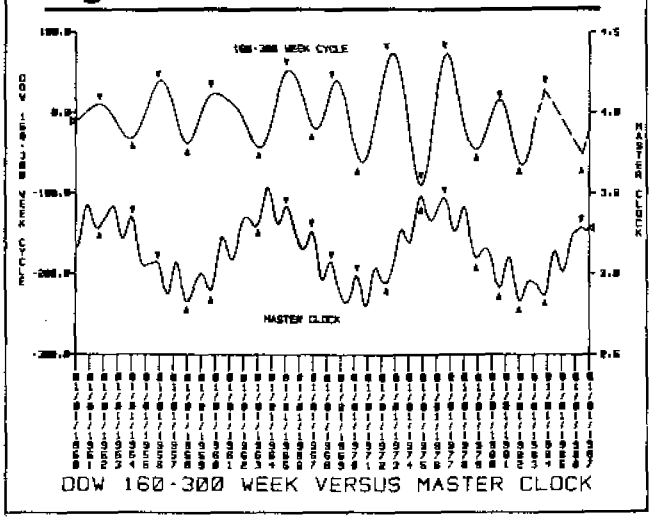
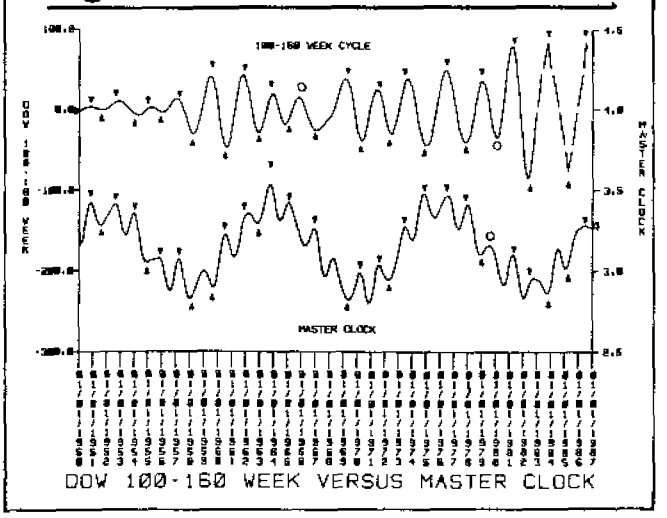


Figure 8



response" of their own. External forces cause a "forced response". When the two are in step, strong motion occurs. This is completely in keeping with the known engineering theories of dynamic systems [Cannon].

It is like spinning a bicycle wheel. It spins at a given rate. When you stroke it, if you stroke too slowly, you slow it down, if you stroke too fast, you speed it up. But if you keep stroking, eventually the wheel will synchronize with your stroking. Market cycles behave in this manner. The only problem is that there are many planetary forces stroking the wheel. Sorting them all out is the trick.

The Master Clock immediately provides a valuable tool for this cycle work. It can be used to overcome the delay effect of digital filters by extending the filter output up to date and even into the future. This is shown in the two dotted line extensions of the top traces in Figures 7 and Figure 8. One takes the average cycle length and adds it to the most recent cycle top or bottom, and tries to find the Master Clock high or low that might provide a synchronization point in this vicinity.

I used this technique to call the nearly simultaneous bottoming of these two cycles in 1982, and the market bottom in 1984. These have proven to be very significant historical bottoms.

The Master Clock and Classic Cycles Alleged in the Research of the Foundation for the Study of Cycles

The Foundation for the Study of Cycles [Wilson] has catalogued cycles in a myriad of things for many years. If the Master Clock is really a great synchronizer, those cycles should relate. Dewey and Mandino give many cycles in their book [Dewey-1]. Some of these are shown in Figure 9.

The Master clock is plotted at the top with vertical lines drawn through each high and low. The 2-3 year and 3-6 year cycles are the two Dow cycles just shown, idealized as triangular waves. The 10.7 year cycle is the actual sunspot cycle that occurred over this period, taken from NOAA data. The remaining cycles shown are from pages 191-196 of Dewey and Mandino.

The 5.91 year cycle shown is that found in coal stock prices, sunspots, copper prices, copper stock prices, grouse abundance, pig iron prices, business failures and railroad stock prices.

The 8.0 year cycle shown is found in precipitation, crude petroleum production, iron production, and Ohio valley rain fall. This cycle, slightly displaced in time, is also found in sugar prices, butter prices, cotton acreage, barometric pressure, rail stock prices, Goodyear sales, cigarette production, the purchasing power of eggs, red squirrel abundance, coal production, pig iron prices, lynx abundance, sweet potato production, whiting abundance, stock prices, barley, rainfall, lead production, and the growth of pines.

The 9.2 year cycle shown occurs in partridge abundance, pig iron prices, copper share prices, common stock prices, wholesale prices, Lewes River closings, industrial stock prices, tree rings, and rail stock prices. Displaced versions of this cycle occur in grasshopper abundance, British consol prices, auto sales, lake levels, and patents issued.

The 9.6 year cycle shown is that found in lynx, salmon, and caterpillar abundance, ozone, tree rings, wheat acreage, and international battles. It is also found, with a time displacement, in river runoff, barometric pressure, magnetic fields, and rabbit and chinch bug abundance.

The 18.2 year cycle shown is found in stock prices, Hamburg construction, real estate activity, real estate transfers, residential building, and building construction. With some-

Figure 9

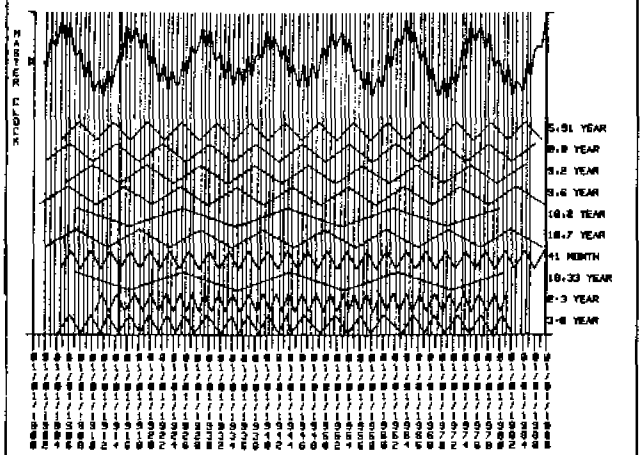
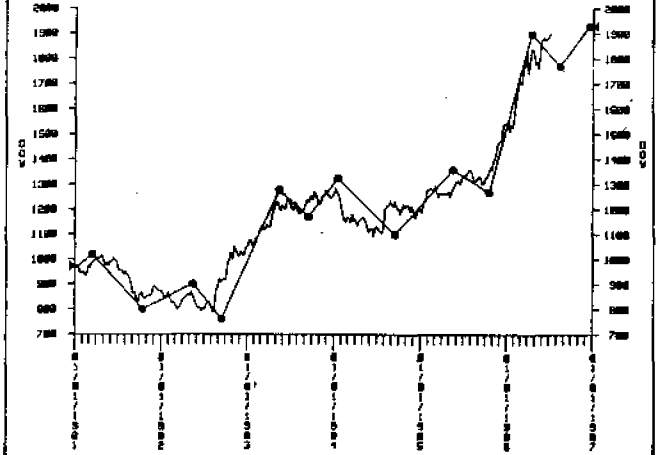


Figure 10



How Digital Filters Work

Filters are tools for "tuning into" parts of the total energy contained in an information stream. For example, all of the information transmitted on the AM radio stations near you arrives at your car radio. If you tried to listen to it all, you would hear a terrible, useless din. But with your radio's dial, you can adjust the "center frequency" of the radio's filter, and select the one station you want to hear. In essence, the filter operates as an electronic door, which can be slid along the dial, letting some of the energy through. If the door is shaped properly, only one station at a time can get through.

In a similar fashion, the information contained in a series of numbers, such as stock prices, can be selected based on how frequently they change. The popular moving average is a special case of such a filter. In general, a filter consists of a set of "weights" (set to 1 for the moving average) by which each data point is multiplied. Then all these multiplication products are added, and the sum is divided by the number of points in the filter, to give an output*FI2* for one point in the filtered data. After computing one output point, the filter weights are slid forward one date, and the process repeated.

For example, the data shown below can be filtered with a 5 point filter, using weights of .1, .4, 1.0, 1.5, and 2.

DATE	DATA	WEIGHTS
6 1 1986	5.0	X .1 = 0.5
6 2 1986	10.0	X .4 = 4.0
6 3 1986	8.0	X 1.0 = 8.0
6 4 1986	10.0	X 1.5 = 15.0
6 5 1986	7.0	X 2.0 = 4.0
6 6 1986	9.0	
6 7 1986	3.0	41.5/5 = 8.3 =
6 8 1986	5.0	Filtered data for
6 9 1986	3.0	6/3/86
6 10 1986	6.0	
6 11 1986	5.0	
6 12 1986	10.0	
6 13 1986	8.0	
6 14 1986	10.0	
6 15 1986	7.0	

The next filter output can be calculated by sliding the weights down one day, and repeating the process of multiply, add, and divide. Try it. The next filter output should be 8.54. If you continue to calculate these *digits*, you are *digitally* filtering the data. If you plot the data and your filter's output, you will get the plot below. Notice how nicely this filter selects the slower moving cycle in the data and eliminates the faster cycle. With proper choice of filter weights, the faster cycle could be extracted.

what different timing it shows up in Java tree rings, sales of an industrial company, and marriages.

The 41 month cycle is the famous Kitchin cycle, which has been found in many price and production cycles, including stock prices.

The 18.33 year cycle is found in real estate activity, building construction, loans, lumber production, furniture production, pig iron prices, rail stock prices, and others. The one shown is for real estate activity.

Close examination of Figure 9 shows the amazing result: *all of the cycles have a relationship to the Master Clock*. Indeed, the association of all these cycles with the astrophysical model is what suggested the term Master Clock. This Master Clock is strictly composed of an astrophysical model of planetary configuration. The cause of the cycles may lie in the heavens.

The Search Continues

Does this result mean that other things, such as Elliott Wave Theory, are not valid? No. In fact, this result helps explain why there should be persistant wave action. Bob Prechter, publisher of "The Elliott Wave Theorist", very effectively uses cycle techniques to help him sort out the wave counts. The Master Clock and other outputs of the astrophysical model can be used for the same purpose. Further, the Master clock may relate to and explain many of W. D. Gann's techniques.

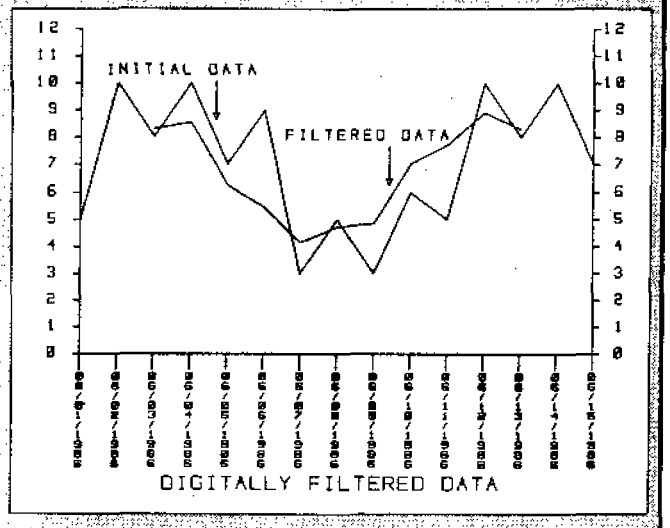
Current research is focusing on using the model to help identify turning points (called astro points) at which particular markets reverse trend, very much as Wilder is apparently doing with his Delta system [Bowman]. While results are not yet finalized, progress is encouraging. Figure 10 shows one recent result, a set of major turning points computed for the Dow from 1981-87.

Conclusion

One cannot but be amazed at the Master Clock. Derived completely from an astrophysical model, it relates directly to cycles extracted from real market data. Further, it has been shown to relate to weather [Larson], and many of the classic non-market cycles. It is a new step in cycle analysis.

As encouraging as these results are, we are just beginning to understand the real nature of market cycles. The personal computer has now empowered millions to take up the investigation if they wish. Hopefully, this discourse on the approach and techniques I have used will enable and encourage others to do their own cycle research, as the work and encouragement of the Solar Eagle have paved the way for me.

Happy Trading.



In essence, these calculations have the effect of multiplying cycles of different frequency by a different constant, called the *gain*. In our example, the gain for the longer cycle was 1.0, and that for the shorter cycle was about .1. A graph of gain versus the cycle length is used to show the *response* of the filter.

For an easily understood text on digital filtering, refer to [Hamming].

Bibliography

[Bowman] M. Bowman, "Wilder's Back", *Technical Analysis of Stocks and Commodities*, February, 1986.

[Bradley] D. Bradley, *Stock Market Prediction*, Llewellyn Publications, 1982, St. Paul

[Cannon] R. H. Cannon,Jr., *Dynamics of Physical Systems*, Mc-Graw Hill, 1967, New York.

[Dewey-1] Dewey and Mandino, *Cycles, The Mysterious Forces That Trigger Events*, Hawthorn Books, 1971, New York.

[Dewey-2] Dewey and Dakin, *Cycles: The Science of Prediction*, Foundation for the Study of Cycles, Pittsburgh.

[Foster] W. G. Foster, *Timing is the Key*, Rocky Mountain Financial Forecasts, 1982, Loveland, Co.

[Gann] W. D. Gann, *How to Make Profits in Commodities*, LambertGann Publishing, 1976, Pomeroy, Wa.

[Glass] C. M. Glass, *Discrete Signals and Systems*, USAF Academy, 1975.

[Hamming] R. W. Hamming, *Digital Filters*, Prentice-Hall, 1977, Englewood Cliffs, N. J.

[Hurst] J. M. Hurst, *The Profit Magic of Stock Transaction Timing*, Prentice-Hall, 1970, Englewood Cliffs, N. J

[Jensen] L.J. Jensen, *Astro-Cycles and Speculative Markets* Lambert-Gann Publishing, 1978, Pomeroy, WA.

[Larson] M. A. Larson, "Do Planets Affect Our Weather?", Science Fair Report, 1986, Denver, CO.

[McCormac] Billy M. McCormac, editor, *Weather and Climate Responses to Solar Variations* Colorado Associated University Press, 1983, Boulder, CO.

[Newsweek], "Market Gurus Jolt the Dow", p. 30, July 21, 1986.

[Williams] LCDR D. Williams, *Astro-Economics*, Llewellyn Publications, St. Paul

[Wilson] L. L. Wilson, *Catalogue of Cycles*, Foundation for the Study of Cycles, 1964, Pittsburgh.

new ratios. Should government move to reconnect the dollar and gold in some way, a third monetary age would begin.

In the meantime, let us not be misled into thinking that the 1967-1980 crunch in real stock prices is worse than 1929, or that 1980 represents a Kondratieff bottom. Rather than the solid foundation it has been for two centuries previous, I believe that the price of gold represents an economic source of confusion since 1971, thanks to Nixon-omics.

—GM, Bothell, Washington

Robert Ellison replies:
Your observations are accurate. You raise interesting questions that require further investigation and the test of time.

As to dividing monetary history into several periods, 1971 no more represents a watershed date than does 1933. Nixon's 1971 decision abrogated the dollar-to-gold relationship internationally. Roosevelt's 1933 move abrogated the dollar-to-gold relationship domestically. In both cases, though, the dollar remained the reserve currency of the world; gold, the pre-eminent money of the world.

As far as the relationship of gold and the wholesale price index, historical precedent, back to England in 1562, shows the same low below 40% that is occurring now. Even the German hyperinflation of 1920-24 confirmed my hypothesis that the commodity price and security price index relationship to gold remains consistent throughout the world due to international arbitrage.

—Robert Ellison

I Beg to Differ . . .
I have analyzed the article by Hans Hannula, entitled "In Search of the Cause of Cycles" [September/October 1987]. For seven years I've published a stock market and weather forecasting service based on planetary cycles. So it is with a practical sense that I analyze Hans' article.

I found the first part of his paper, dealing with digital filters and the Dow, interesting. But he did not make it clear that it is impossible to make accurate cycle progressions and Dow forecasts using digital filters, since both the duration and amplitude of the filtered cycle were inconsistent.

Next, Mr. Hannula attempts to prove that the synodic periods of the planets are responsible for the 124- and 208-week cycles of the Dow. To prove this relationship, in Table 1, he (1) determines the weekly synodic period of any planetary combination between Mercury, Venus, Earth, and Jupiter; (2) divides that number into 208 weeks; (3) corrects that figure to be a multiple of .3333 to coincide with Earth's synodic period; (4) then, startlingly, he multiplies that number times the first figure again. Then he claims that "practically all of the possible synodic periods are related and could be causing a nominal 208-week cycle on Earth."

He describes his Master Clock as "the sum of all the planetary stirring forces." Then we go on to learn that the Master Clock is the product of a 13-week moving average of a 33-week moving average of a 125-week moving average. Such a high degree of processing usually indicates a forced fit rather than causal effect.

Next he compares the Master Clock to Dow cycles (Figures 7 and 8). In Figure 7, the Master Clock cycle has 45 peaks and bottoms, and the Dow cycle has 18 peaks and bottoms. Then he concludes that there is an "astounding" coincidence between the two. Any cycle with 45 points can be compared favorably with a cycle of 18 points, due to simple chance. And he's not even comparing tops and bottoms favorably, only turning points. And in the 27 times (Figure 7) and 14 times (Figure 8) that the Master Clock didn't indicate a turning point in the Dow, Mr. Hannula gives no criteria with which to judge what Master Clock turning points to use and what to ignore.

Next he claims that the Master Clock coincides with all of the Foundation's classic cycles. He supports this claim with Figure 9, wherein 105 vertical lines are nonuniformly drawn through the tops and bottoms of the 10 cycles and the Master Clock cycle. Figure 9 is entirely unreadable and incoherent, and in no way substantiates his claim that "all of the cycles have a relationship to the Master Clock."

Finally, there's Figure 10, wherein he compares 11 of his Master Clock turning point signals (with no precise dates) to a chart of the Dow from 1981 to 1987. It looks good, but close examination reveals otherwise. According to turning point logic (if the market is going up, sell; if it's going down, buy), five out of the 11 turning points should have been the opposite of what he indicates. For instance, the fourth Master Clock turning point occurs in September 1982, right in the middle of a rip-roaring Dow advance. According to turning point logic, that should have been a Sell signal, not a Buy signal as indicated. However, even ignoring this problem, from signal to signal, only four out of 11 would have been profitable, and three of those only marginally.

In summary, the author presents some cycle research which is of no predictive value and mathematically questionable. His attempt to provide a predictive tool turns out to be very

highly processed, which throws doubt on its predictive, let alone causative, usefulness. What predictive value there is to it is loosely applied and inaccurately presented. In conclusion, I think there's room for improvement.

—Larry Berg, Omaha, Nebraska

Hans Hannula replies:

I would like to comment on Mr. Berg's letter. He raises several points that are not valid, and that would have been clarified by a more careful and studious examination of my article. But others may share Mr. Berg's confusion, so an explanation is in order.

Mr. Berg asserts that it is "...impossible to make accurate cycle progressions and Dow forecasts with digital filters because the amplitude and duration are inconsistent." This is partly true and partly false. Properly used, wideband filters will extract a cycle, complete with its variations. The only problem is its delay. It is an historical research tool of tremendous value if used skillfully. It is true that, without other tools, this does not allow one to predict the Dow. Any tool that uses an accumulation of past data alone to predict a time sequence, without an understanding of the underlying causes that affect that time sequence, will fail. The whole point of my article is that prediction is possible if one can establish the links between the earthly cycles and the very predictible motions of the solar system and the computable forces within it.

Mr. Berg's second comment concerns Tables 1 and 2. Regretfully, he has missed the whole value of them. I am not merely massaging numbers to "amaze" readers, as Mr. Berg implies. Nor am I attempting to "...prove that the planetary periods are responsible for the 124-and 208-week cycles of the Dow." The tables are used simply to answer the question, Is it possible that there are exact integer relationships between earthly cycles and planetary cycles? and to give a simple procedure for examining the possibility. The text in the article explains the procedure accurately, so I shall not repeat it here. What these two tables establish is that there are strong integer relationships between the planetary cycles and the Dow's 124- and 208-week cycles . For example, the 16.5 Mercury cycles (Table 1, line 1) tell us that 33 cycles of Mercury would equal two earthly cycles of 207.3555 weeks. This does not prove a relationship. It merely establishes a possibility, presents evidence of a linkage, and gives a very precise cycle length to use in re-examining the earthly data. This method is much more useful if one has high precision estimates of the earthly cycles, hopefully to three or four decimal places. The nominal 208-week cycle used as an example does not really do justice to the analysis method because of its low precision. If one had a more precise estimate for the cycle, such as 207.3555 weeks, one might start to think they had "proven" something. But mathematically and scientifically, one must treat claims of proof very carefully, which is why I say that the tables "...give strong evidence that there are many planetary cycles that could contribute..." Proofs are mathematical operations that are absolutely true. Evidence of a cause and effect is just that—evidence. You may choose to believe the evidence or not. The scientific approach is to pursue the trail of evidence, and try to verify or refute it with further research. Using much more sophisticated techniques than Fourier analysis, it is possible to extract cycles from the Dow which have three to four, even five, decimal-place accuracy, and then find exact planetary period multiples that compare very accurately. For example, Peter Eliades has reported a market cycle of 218.667 weeks; 74 orbits of Mercury take 218.665 weeks, which is a comparison ratio of 1.0000091.

The third point Mr. Berg raises is that the Master Clock, being smoothed by three different moving averages, must have been a "...forced fit." This simply is not true. I am an experienced scientific researcher, and I would never force evidence. The smoothing used is very carefully chosen to actually implement a digital low-pass filter designed to eliminate high-frequency components in the data series, which is a standard procedure in scientific computing. The key point here is that the 1.6-year component is so strong that it refused to be eliminated. Interested readers should refer to Appendix C of [Hurst] for a derivation of the filter behavior of moving averages.

The fourth point Mr. Berg attempts to make is that synchronization of the Dow cycles and Master Clock shown in Figures 7 and 8 is random and could occur by chance. This is not true, as is easily shown by probabilities. Assume the two series are independent. If we take the interval of the graphs (37 years) and apportion the years into 12 monthly "buckets," we get 444 buckets. Now if we take Figure 7, with 45 Master Clock peaks or valleys, we get a probability of finding a turning point in any single bucket of 45 out of 444 = .101. Similarly, the probability of finding a turning point of the Dow in any one bucket is 18 out of 444 = .0405. Now, to find the probability that we find both a Dow and Master Clock turning point in the very same bucket (i.e. within a month of each other), we multiply the probabilities, and get .101 x .0405 = .0040945, or one chance out of 250. That is the probability of finding just one such alignment. Figure 7 shows 16 such alignments, which is even less probable. I leave it as a simple exercise for readers to compute the probability of doing something 16 successive times if the chance of success on

each try is one chance in 250. The correct answer really is "rather astounding."

Mr. Berg claims I have not given any guidance about which Master Clock turning points to use and which to ignore. I do, in fact, give a specific technique in the next-to-last paragraph, under the heading "The Master Clock as a Synchronizer." That technique allowed me to call the 1982 bottom, the 1984 bottom, and the September 1986 bottom, so it does have practical value.

Mr. Berg is unhappy with the size of Figure 9. On this, we both agree. I have repeatedly asked to have my graphs printed larger, but the pressures of print space seem to dictate otherwise. I provide all my graphs on 8 x 11 inch paper, and they are reduced for publication. Any reader who wishes larger copies may write me directly. Mr. Berg has been sent more readable copies under separate cover.

Finally, Mr. Berg objects that he could not have traded the market successfully using Figure 10. It was never my intent that anyone use that illustration for that purpose. Mr. Berg has incorrectly interpreted Figure 10. It is simply an early example of other research on market turning points using more recent work, and is actually a separate piece of work from the Master Clock, as carefully explained in the article. The Master Clock work was done nearly a decade ago, and my research has progressed greatly since then. Mr. Berg incorrectly assigns his own Buy and Sell rules to Figure 10, assuming incorrectly that the short-term trend at the turning date tells you whether to buy or sell, which is invalid in my approach. What Figure 10 does show is that a few well chosen, astrophysically derived points can give a very good approximation of a longer term cycle in the Dow. My work has progressed quite far beyond this, in fact, and I have successfully picked short-term turning points within days. But I do not feel such matters are appropriate material for a nonprofit research journal, so I shall not discuss them here.

I appreciate the interest Mr. Berg and other readers have had in my work. I have received many supportive and informative letters, and am encouraged by some of the work being done in this area. I know planetary cycles are important. To master them takes work and skill. This avenue of research has been extremely fruitful for me, which is why I have published this material for others, even against the advice of some very trusted friends. Those who hope to follow this line of research must understand their physics, mathematics, computing, and systems theory, and apply the scientific method rigorously, or they will be swallowed up in a sea of confusion. Hopefully, this letter will part some of the waves for Mr. Berg and perhaps other readers.

—Hans Hannula

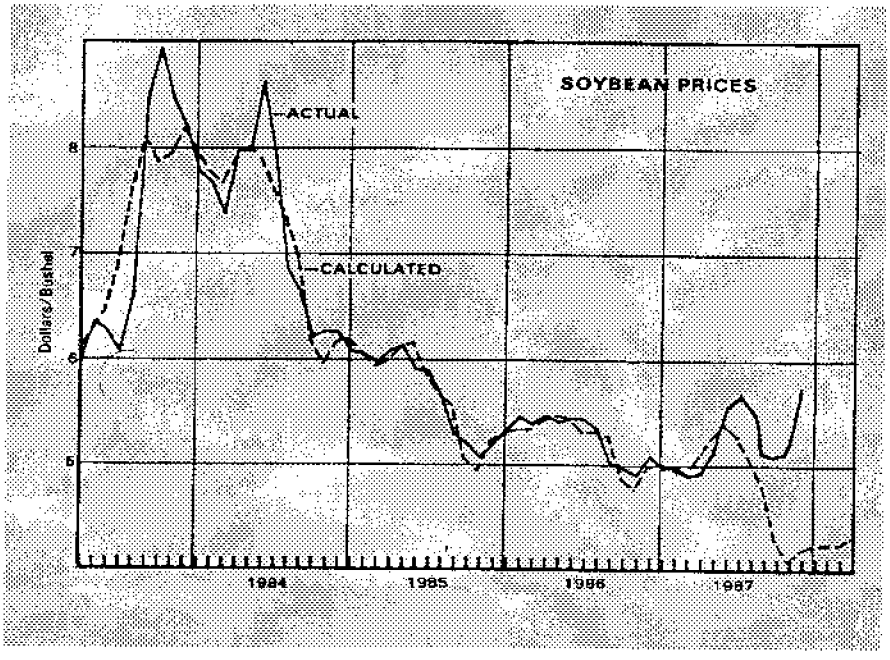
HOW IT CAME OUT

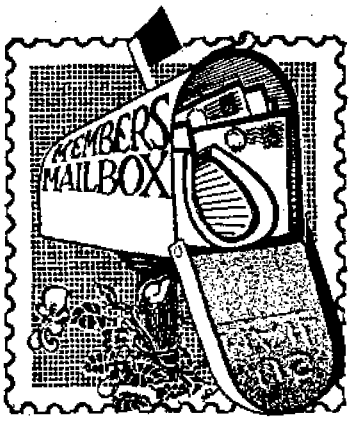
Soybean Prices
(Right)

Earthquake Cycles:

Maximum Stress Periods Through February 1988

January 18, 1988
February—none





CALENDAR OF EVENTS

See page 43 for calendar listings.

LETTERS

The Harmonic Relationship of CPI Spectral Density Periods to the Ancient 39.5797-year (474.957-month) Solar Cycle

An article by Michael Niemira, "In Search of Economic Cycles" [January/February 1988], included a chart that plotted cycle lengths and their spectral densities derived from the monthly CPI values between 1948 and 1987. If cycle lengths with a spectral density so low as to consititute a null are included, then 21 cycle lengths are shown.

In an attempt to trace the individual cycle lengths back to known solar and lunar cycles, I observed that several cycle lengths were harmonics of an ancient 39.5797 year (474.957 average month) solar cycle. I decided to test all 21 cycle lengths for their harmonic relationship, if any, with the 39.5797-year cycle. The procedure and results are shown in Table 1 (right).

Column 1 lists the *Published Length* in months of the 21 cycles, with a trailing zero added.

Column 2 shows the *Estimated Harmonic*, the result of dividing the base cycle (474.957 months) by each of the cycle lengths in column 1.

Column 3 lists the *Harmonic Integer*. While some approximations are better than others, there is no doubt that the estimated harmonic figures in column 2 very closely approximate the integers listed here.

Column 4 is the *Calculated Length* in months, the result of reversing the process and dividing the base cycle (474.957 months) by the harmonic integer in column 3.

Column 5 lists the *Difference* between the published cycle lengths and the calculated cycle lengths, in months.

Notice that the worst case difference between the calculated and published cycle is .0608 month. This is equal to 2 days in a span of 118 months! It is rather remarkable that the spectral lines picked out of the CPI by an unbiased spectral analysis are so well approximated by 21 consecutive harmonics of the ancient 39.5797-year solar cycle!

As an additional comment, I'd like to point out an interesting feature of the base cycle of 39.5797 years. It is almost exactly equal to 61 synods of Venus and Jupiter, 100 synods of Mercury and Venus, and 161 synods of Mercury and Jupiter! If these three numbers are each divided by 100, we arrive at the decimals 0.61, 1.00, and 1.61. These are astrophysically derived values that correspond to the Fibonacci series so well studied by Robert Prechter in his Elliott Wave research.

Could this be further evidence of the Fibonacci ratio's presence throughout the universe?

—The Solar Eagle

Table 1

Harmonic Relationship of CPI Spectral Density Periods to the Ancient 39.5797-year (474.957-month) Solar Cycle

	Published Length (months)	Estimated Harmonic	Harmonic Integer	Calculated Length (months)	Difference (months)
1	118.80	3.998	4	118.74	.0608
2	95.00	4.999	5	94.99	.0086
3	79.20	5.997	6	79.16	.0405
4	67.90	6.995	7	67.85	.0490
5	59.40	7.996	8	59.37	.0304
6	52.80	8.995	9	52.77	.0270
7	47.50	9.999	10	47.50	.0043
8	43.20	10.994	11	43.18	.0221
9	39.60	11.994	12	39.58	.0203
10	36.50	13.013	13	36.54	-.0351
11	33.90	14.011	14	33.93	-.0255
12	31.70	14.983	15	31.66	.0362
13	29.70	15.992	16	29.68	.0152
14	27.90	17.024	17	27.94	-.0386
15	26.40	17.991	18	26.39	.0135
16	25.00	18.998	19	25.00	.0023
17	23.80	19.956	20	23.75	.0522
18	22.60	21.016	21	22.62	.0170
19	21.60	21.989	22	21.59	.0111
20	20.70	22.945	23	20.65	.0497
21	19.80	23.988	24	19.79	.0101

CALENDAR OF EVENTS

World Headquarters Chapter Meetings

The following speakers are scheduled to appear at upcoming meetings at Foundation World Headquarters, Irvine.

August 9
Martin Kokus: "Lunar/Solar Cycles in Earthquake Prediction"
September 13
Walt Bressert, Peter Eliades, Peter Hackstedde: "1988-89 Stocks and Commodities" Panel
October 11
Sherman McClellan: "The McClellan Oscillator"

If you can't make the meeting, detailed summaries are available at $5.00 each, $50.00 annually.

Spring 1989 : "Cycle Linkage II"

The Second Annual Cycle Linkage Conference, "Cycle Linkage II," will be held at Foundation World Headquarters in Irvine next Spring. Papers are now being accepted for consideration. Deadline for completed papers is December 15, 1988.

ANNOUNCEMENTS

Upcoming "Gravitation" Issue

Cycles will devote an upcoming issue to non-Newtonian gravitation and fifth force theories. Papers are invited on these and related topics in earth science, astronomy, and cosmology. Papers should conform to the writing style and math level found in *Cycles*. They should not exceed 2,000 words, and jargon should be avoided. Graphs and figures are encouraged. Submit your papers to Martin Kokus, "Gravitation Issue," at the Foundation's address.

New Science Newsletter

The Foundation is considering publishing a newsletter on non-Newtonian gravity, nontraditional earth science and earthquake prediction, planetary sunspot influence, non-big-bang cosmologies, and grand unification theories. The newsletter will publish current developments in these fields, as well as subscribers' papers and predictions, help in securing data, and facilitate networking. If interested, contact Martin Kokus at the Foundation by September 5.

LETTERS

Planetary Effects on the Sun

In view of the recent surge of interest in the barycentric model of the solar system, it seems appropriate to calculate the relative forces exerted on the sun by each of the planets (see Table 1).

Table 1
Solar System Data

Planet	GRAV.	TIDAL	BARY.	MASS	PERIOD	RADIUS
Mercury	.36	.94	.02	.05	.24	.39
Venus	1.54	2.13	.58	.81	.62	.72
Earth	1.00	1.00	1.00	1.00	1.00	1.00
Mars	.05	.03	.16	.11	1.88	1.52
Jupiter	11.61	2.23	1633.32	314.03	11.86	5.20
Saturn	1.03	.11	896.95	94.01	29.47	9.54
Uranus	.04	.00	275.97	14.38	84.05	19.19
Neptune	.02	.00	511.04	17.03	164.40	30.01
Pluto	.00	.00	.10	.00	247.06	39.37

GRAV. is the gravitational force of each planet at the sun relative to that of the Earth; TIDAL is the tidal force of each planet at the sun relative to that of the Earth; BARY. is the relative effect of each planet on the position of the barycenter with respect to the sun compared to that of Earth; MASS is the mass of the planet compared to the mass of the Earth; PERIOD is the orbital period of the planet relative to Earth's; RADIUS is the average radius of the planet in astronomical units, as found from Kepler's law relating orbital periods and radii (included for reference only).

The relative magnitudes in the TIDAL column help explain the emphasis on Mercury, Venus, Earth, and Jupiter by the cycle students of antiquity, while the relative magnitudes in the BARY. column help explain why modern studies of long-term effects concentrate on Jupiter and Saturn.

– Solar Eagle

MEMBERS FORUM

A clearinghouse for members to express their opinions, ideas, and questions.

CALENDAR OF EVENTS

WHQ Chapter Meeting

The World Headquarters Chapter meeting on October 11 will feature guest speaker, Sherman McClellan, who will discuss his invention, the McClellan Oscillator.

Elliott Wave Conference

A one-day Elliott Wave Conference, "The Art of Trading with Elliott Wave," will be sponsored by the Foundation in association with Glenn Neely. The conference will be held on Saturday, December 3, from 9 a.m. to 5 p.m. in Los Angeles. Fees for members are $395 ($455 nonmembers) for reservations made before November 5. See page 223 for details.

1989 Annual Conference

The Foundation's Second Annual Cycle Linkage Conference, "Cycle Linkage II," will be held March 9-12, 1989, in Irvine, California. Fees for members are $295 ($355 nonmembers) and include workshops and lectures on Friday and Saturday, as well as the banquet Friday night. A field trip is planned for Sunday. See the inside front cover for details.

LETTERS

Cycles Group in New York

I am looking to join/form a local Cycles/CAP II group. Anyone in the (212)(718)(516) area codes may contact me at (516) 531-1015 during business hours, or at (516) 666-4544 evenings and weekends.

—Tim Long, Melville, NY

Masterclock Decoded

Hannula's Masterclock [*Cycles*, September/October 1987, p. 159-166] raises some interesting possibilities and also some interesting questions. (See, for instance, *Cycles*, July 1988, p. 163.) His reference to solar tides is intriguing, but analysis of the masterclock revealed that the alleged relationship with solar tides is somewhat tenuous. This does not mean that it is invalid. The truth is, we have no real knowledge about the mechanisms that couple the planetary positions to the behavior of the stock market. To gain more understanding, however, the study of suspected relationships is very valuable.

Solar tides are caused primarily by the four tidal planets with the following relative tidal forces:

Mercury	1.15 ± 0.65
Venus	2.17 ± 0.04
Earth	1.00 ± 0.05
Jupiter	2.28 ± 0.32

These figures are derived from M/R^3, with mass normalized to Earth mass and R expressed in astronomical units (Earth orbital radius). The variability in the figures is caused by the eccentricity of the planetary orbits. The other planets are usually ignored, having the following relative tidal forces: Mars 0.03, Saturn 0.11, and the others less than 0.01.

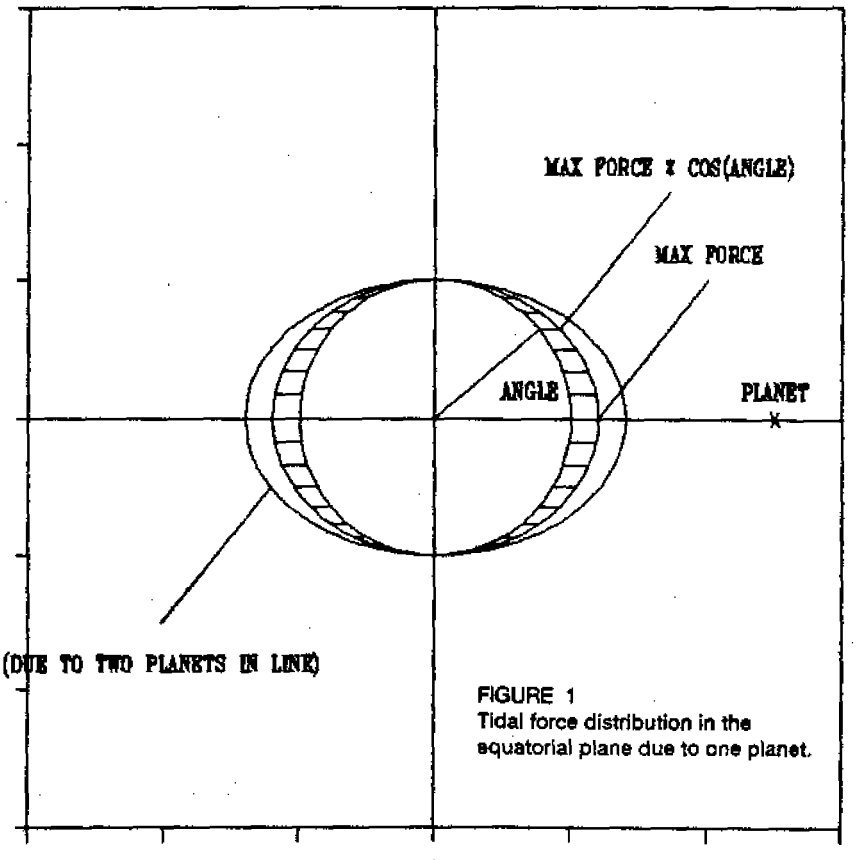


FIGURE 1
Tidal force distribution in the equatorial plane due to one planet.

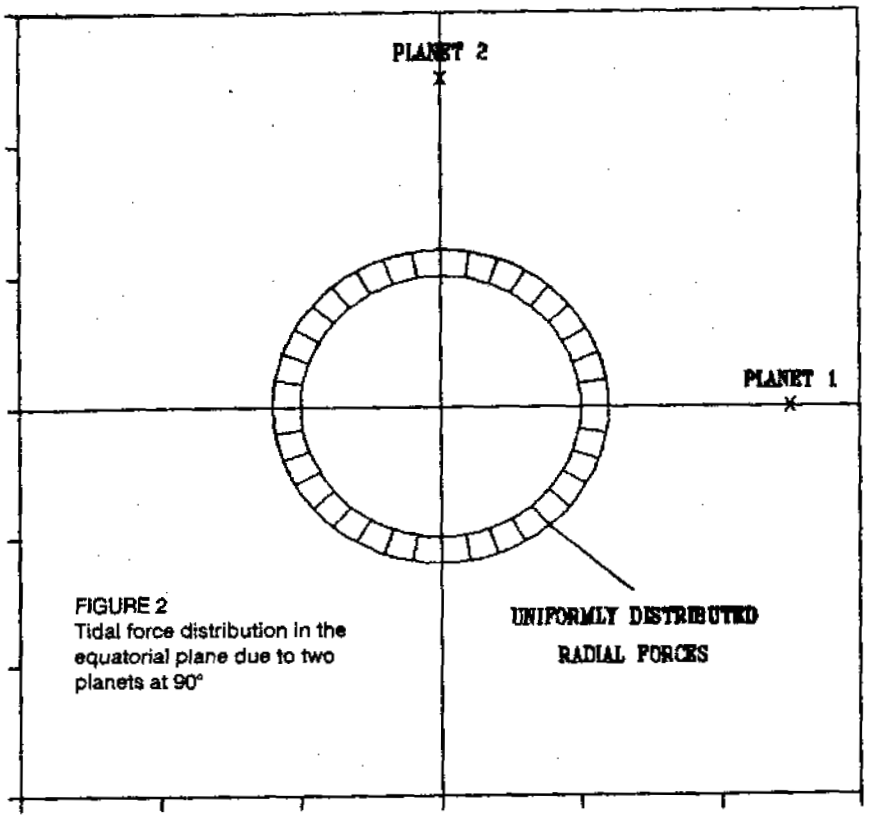


FIGURE 2
Tidal force distribution in the equatorial plane due to two planets at 90°

Tidal forces as computed by M/R^3 do not add vectorially. This equation only establishes the maximum force exerted directly in line with the planet. A single planet causes a tidal force distribution that is a cosine function of the angle between the direction of the planet and the direction of each Sun surface element under consideration.

Figure 1 shows force distribution in the equatorial plane; but distribution in the meridial plane in the direction of the planet is identical. Since tidal forces are the differences between gravitational (decreasing with range) and centrifugal forces (increasing with range), tidal forces induced by a planet on the opposing hemisphere are the mirror image of those on the facing hemisphere. Hence, the Sun is pulled from both sides, resulting in a tidal bulge. (The Earth-Moon system works the same way.)

The tidal forces due to the position of two planets in line are simply the sum of their individual distributions (see Figure 1), irrespective of whether they are in conjunction or opposition. So from a tidal point of view, conjunction and opposition have the same value. Two planets with equal tidal forces (Venus and Jupiter) at 90° from each other cause a tidal force distribution in the equatorial plane as shown in **Figure 2**. The forces are now uniformly distributed, strictly in radial direction, with magnitudes equal to the (maximum) force of a single planet.

This is not the case in the meridial plane, however, where the distribution is still analogous to Figure 1. For three and four planets, the picture becomes more complicated and can be found by (vectorial) addition of the forces for each individual element of the Sun's surface. Thus, it can be seen that addition of the tidal forces on the Sun's surface is not a trivial matter.

The 1.6-year cyclic component of Hannula's masterclock appears to be

Table 1
Venus-Earth Heliocentric Conjunctions and Oppositions

o	6-22-1960	c	8-27-1975
c	4-10-1961	o	6-18-1976
o	1-27-1962	c	4-06-1977
c	11-12-1962	o	1-22-1978
o	8-30-1963	c	11-07-1978
c	6-19-1964	o	8-25-1979
o	4-12-1965	c	6-15-1980
c	1-26-1966	o	4-07-1981
o	11-09-1966	c	1-21-1982
c	8-29-1967	o	11-04-1982
o	6-20-1968	c	8-25-1983
c	4-08-1969	o	6-15-1984
o	1-24-1970	c	4-03-1985
c	11-10-1970	o	1-19-1986
o	8-27-1971	c	11-05-1986
c	6-17-1972	o	8-23-1987
o	4-09-1973	c	6-12-1988
c	1-23-1974	o	4-04-1989
o	11-06-1974	c	1-18-1990
		o	11-01-1990

c = conjunction o = opposition

a straight vectorial addition of the maximum tidal forces (M/R^3) of Venus and Earth. Hence, it looks like a vectorial addition of the gravitational forces, scaled to tidal relationships. As a result, the synodic beat frequency of Venus-Earth (VE) is obtained as shown in **Figure 3**. The tops of this synodic cycle are caused by VE conjunctions, and the bottoms by oppositions. From a tidal point of view, tops and bottoms have equal value. And, indeed, Hannula uses them this way, since they each sometimes coincide with market tops and sometimes with market bottoms.

Comparison of Figure 3 with Hannula's Figures 7 or 8 [*Cycles*, Sept/Oct, p. 163] shows the coincidence between tops and bottoms of the masterclock and the VE-cycle, except that Hannula reverses the sign. Hence, his bot-

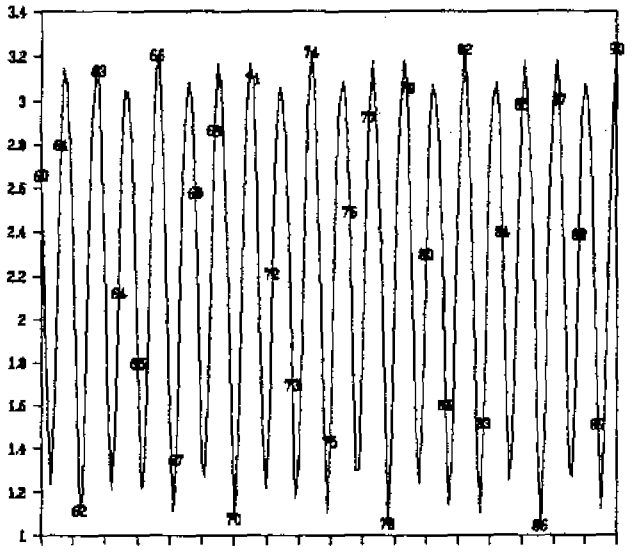


FIGURE 3 Venus-Earth Synodic Cycle

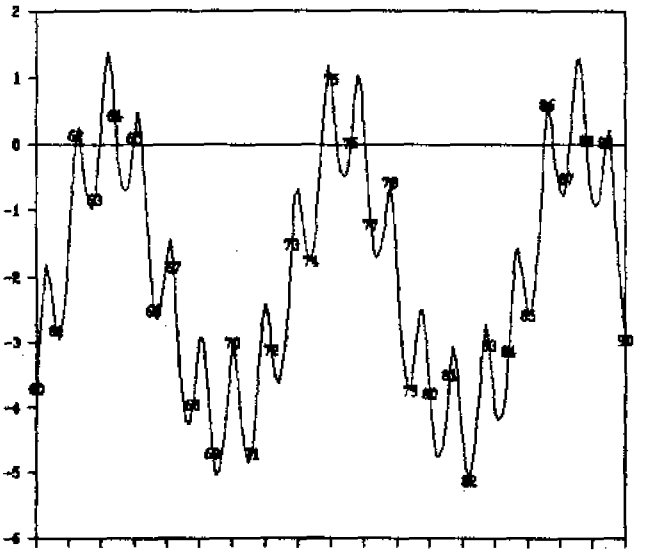


FIGURE 4 Results of Masterclock Analysis

toms are coincident with conjunctions and his tops with oppositions. In addition, the VE-cycle in the masterclock is superimposed on a derivative of Jupiter's orbital cycle. From a tidal point of view, there is no slower planetary candidate available to beat Jupiter against; so Jupiter apparently has been beat against a fixed point on the ecliptic. At first sight, this seemed to be the vernal equinox. Closer examination, however, revealed that it is Jupiter's perihelion at 15° from the equinox. Hence, at the top of the Jupiter-derived cycle, its tidal forces are maximum, with the minima located at the bottoms.

The masterclock derived this way is shown in **Figure 4**. Again, comparison with Hannula's figures shows the close coincidence between his masterclock and the analysis presented here. Purposely, however, I have used the terms "seem" and "appear", since I have no knowledge of his code. The basis for his clock, however, is clear.

The meaning of the Jupiter cycle is not clear, since there is no indication in Hannula's paper of how it is being used. Nor is the reason for inverting the VE-cycle clear. If only the tops and bottoms of the VE-cycle are used, my Figure 3 would be sufficient; or a straight listing of the dates of heliocentric conjunctions and oppositions (See **Table 1**) would do. The use of a cyclic curve may have the advantage of establishing a region or orb. This, however, does not seem necessary, and knowledge of the exact dates is useful for further investigation.

To see what the exact VE conjunction/opposition dates mean, I superimposed them on a chart of the S&P Index. Coincidence with market tops and bottoms is not extremely impressive, except for August 23, 1988. This one, however, may be part of a larger planetary constellation as described by Fults [See Cycle Linkage: Planetary-Solar-Terrestrial, May 88, Foundation for the Study of Cycles]. However, a very interesting observation is to be made here. All other planetary studies, to my knowledge, try to correlate planetary positions with exact market, or other, tops and bottoms. But there is no need for this if individual terrestrial cycles are driven by specific planetary aspects.

It is well known that individual cycles extracted by filters from an earthly phenomenon, such as the market, are not exactly in phase with precise market tops and bottoms, but that the sum of a number of cycles approaches market behavior. And that is exactly what Hannula has done. The tops and bottoms of the VE cycle are coincident with the tops and bottoms of the output of certain filters. A question that may be raised immediately is, What is the influence of the design of the filter?. Hannula indicates the use of a multipoint filter in his paper. Is that the filter he really uses? What about a simple exponential or moving average filter? Other questions that come to mind are: What about Mercury's influence? What about the other planets? (The tidal picture may not be necessary at all!).

I want to apologize to Hannula for dissecting his masterclock. I feel, however, that he discovered some very interesting relationships between terrestrial cycles and planetary positions. These relationships should not be ignored and deserve further exploration. If this analysis helps other researchers in their investigations of planetary effects, I hope to hear from them via this *Cycles* reader forum.

—Val Star

sonalities" of impulse waves, which any Elliottician would recognize.

The heart and soul of Elliott is "form." After all is said and done, the form should be 5 waves up and 3 waves down, not 3 waves up.

When Elliott found anomalies, he devised principles to explain deviations between the actual market and normal wave form. These were relatively minor. For example, the Zig-Zag, the Flat, or the Triangle corrections are ways to understand 3 waves down. But they all go *down*, for the most part, not up. That's the idea of form.

In Neely's work, a correction can go up – not just a little, but a tremendous amount. In Neely, you lose the "form," which is the heart of Elliott. The most important part of Elliott is 5 waves up and 3 waves down; of secondary importance are the anomalies and subsidiary principles. Neely has elevated the anomaly to the most important, and form has become secondary.

Lastly, I would like to say that it was Robert Prechter who made all of us aware of the Elliott Wave theory in the early 1980s. He is also the one who used Elliott Wave to predict the great rally in stocks long before nearly all commentators believed it possible. Robert Prechter has continued the great work that R.N. Elliott began

Glenn Neely's work may be "additions to" the principles of R.N. Elliott, but they are NOT Elliott Wave! Perhaps it is time to draw a distinction between Elliott's work (best followed by Prechter) and Neely's "extensions." I recommend identification of Neely's work as "Neely Wave" or "Neely Extension Waves," so that a proper comparison to Elliott Wave may be pursued.

—Joe English

No Cigar for Star . . .

I would like to respond to reader Val Star's "decoding" of my Master Clock [*Cycles*, September/October 1988].

Simply put, his efforts are incorrect. His assumption that the published Master Clock was somehow constructed by gluing together cosine waves for Jupiter and Venus is incorrect. The Master Clock is computed exactly as described in the original article [*Cycles*, September/October 1987]. I quote:

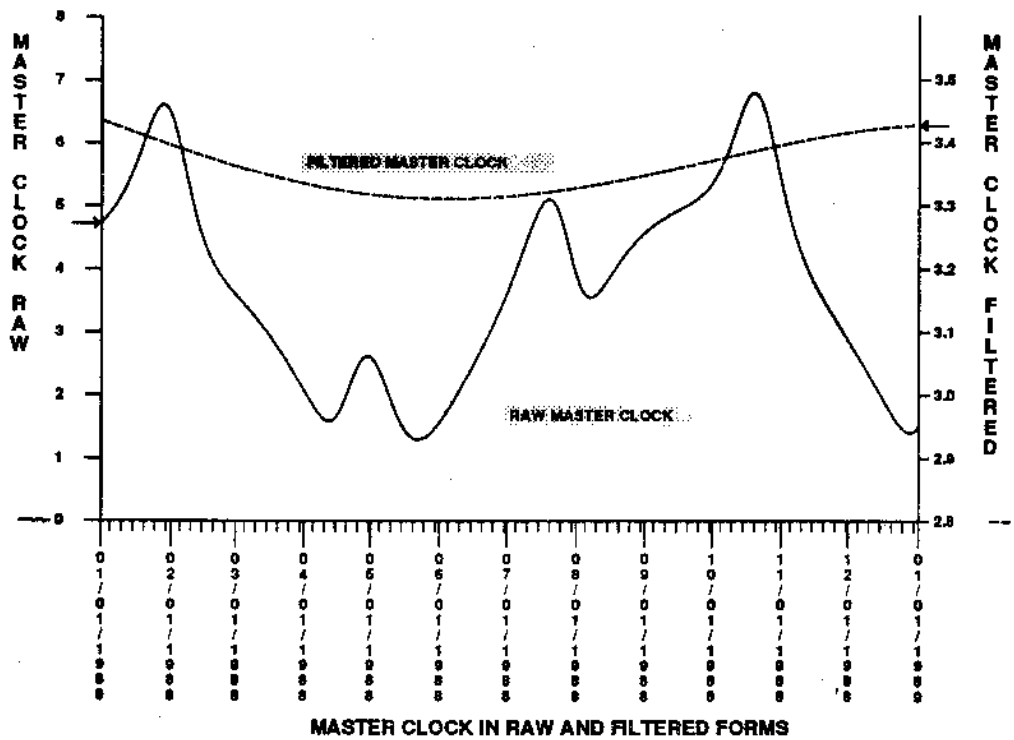
"It is the sum of all the planetary stirring forces, computed by

$$F = G K M / R^3$$

where G is the gravitational constant, K is an arbitrary constant, M is the mass of the planet, and R is the distance it is from the sun. . .

"At first, this force seemed to have no relationship to the Dow, so various moving average filters were tried. There was a particularly strong cycle of about 1.6 years that I tried to smooth out. It frustrated repeated efforts to do so. For some time I considered it a 'royal pain'. But it is now called the Master Clock for reasons

Fig. 2



MASTER CLOCK IN RAW AND FILTERED FORMS

which will become clear. Its value became apparent one day when I happened to plot the stirring force, filtered by 125-, 33-, and 13-week moving averages, versus the Dow 160-300 week data."

In other words, the Master Clock is computed as follows:

1. Compute the force for each planet. The magnitude of the force is given by the tidal force equation. The direction is a unit vector from the sun toward the planet.
2. Add the nine individual forces vectorially.
3. Take the magnitude of the result vector as a time function.
4. Smooth the function with a 133-week centered moving average.
5. Smooth the result of 4 with a 33-week centered moving average.
6. Smooth the result of 5 with a 13-week centered moving average.

In my original work, I computed the forces every Friday, and used a weekly data series. If calculations have been done correctly, the result is the Master Clock as published.

Because it is easy to make mistakes in this type of calculation, I have made available through the Foundation the precomputed Master Clock. The data series contains two files: (1) the *filtered* Master Clock as computed above, and (2) the *raw*, intermediate data (computed through step 3 above), before filtering. Fig. 2 shows both forms of the Master Clock for 1988. You can see that the Raw Master Clock has a lot of variability, while the Filtered Master Clock is very smooth.

Star asks about the effect of the filters used. Basically, they serve as low-pass filters, removing rapid swings in the data while preserving the slower swings. The frequency response of a single moving average filter is correctly derived and presented in Hurst's *The Profit Magic of Stock Transaction Timing* [Prentice Hall] (p. 207-211). Basically, the frequency response is (sin x)/x function, with the first zero crossing at a frequency of 6.28 times the span of the moving average. In other words, in the 133-week moving average operation, the 125-week cycle is cancelled out or multiplied by a "gain" of zero, while a frequency of half the span (62.5 weeks) is passed at a gain of 0.65.

A series of moving averages such as I used can be used to build a better low-pass filter without too much work. Other low-pass filters can be used, such as an exponential moving average, or a properly designed FIR digital filter. The important step is to make sure that the filter output is properly delayed for the time lag of the filter. For the moving-average filter, the delay is one half the span, or 62.5 weeks for the 125-week filter.

Star apologizes for "dissecting" my Master clock. I cannot accept an apology for something that was not done. There was never any attempt or desire to hide the computation of the Master Clock. Indeed, the purpose of the original article was to put the computation in the public domain. Unfortunately, it seems to have been a mistake to use financial data for this cycle work, because that has allowed people to assume that I am hiding something in the published work. I am not. What you see is open, on the table, and scientifically accurate. This is not the norm in market work, where "indicators" are invented every second, and "correlations" are used to inspire sales, and practically no one uses sufficient data and testing to back up their claims.

An observation that something happened once or twice before "when the moon was blue" is not sufficient data to support a prediction. Even 30 prior experiences barely gives enough evidence that a correlation is statistically valid. Without a thorough understanding of the underlying physical causes of events, one simply cannot make good scientific progress.

Once uncovered, the laws of physics always work. While recent research on new forces is interesting, I have found the well known gravitational, tidal, and other classical forces totally sufficient to explain every cyclic event that I have investigated.

I by no means want to discourage Val Star or any other planetary researcher. It is the proper direction. But I would encourage Val and others to use known physics, good computation, and good scientific method in their work. And when it comes to my work, please do not try to "read between the lines." When I publish something, it is all there as clearly as I can express it and as competently as I can compute it. To avoid a lot of wasted time trying to second guess what I have done, call me. I do answer questions on my published work. Such a question could save hours in work trying to figure out why I inverted Venus when I didn't. Happy Cycling.

—Hans Hannula

Fibonacci Ratios in Econometric Time Series . . .

In the past few years, a number of financial analysts have used Fibonacci numbers to estimate possible wave retracements in econometric time series (such as the DJIA), based on the observation that past wave retracements often have exhibited these ratios.

This discussion will first cover the mathematics of deriving Fibonacci numbers. I will then show that the mathematical numbers function only because they are a reasonable approximation of the ratios of the average cycle periods (ACP) of the planetary synodic periods involved in driving the Sun's 20-week cycle.

In Table 1, column *T#* shows the index number of each term in the arithmetic series. The *Term* column lists the numbers of the basic Fibonacci series. [To constitute a Fibonacci series, the third number of the series must equal the sum of the first two; the fourth number of the series must equal the sum of the second and third num-

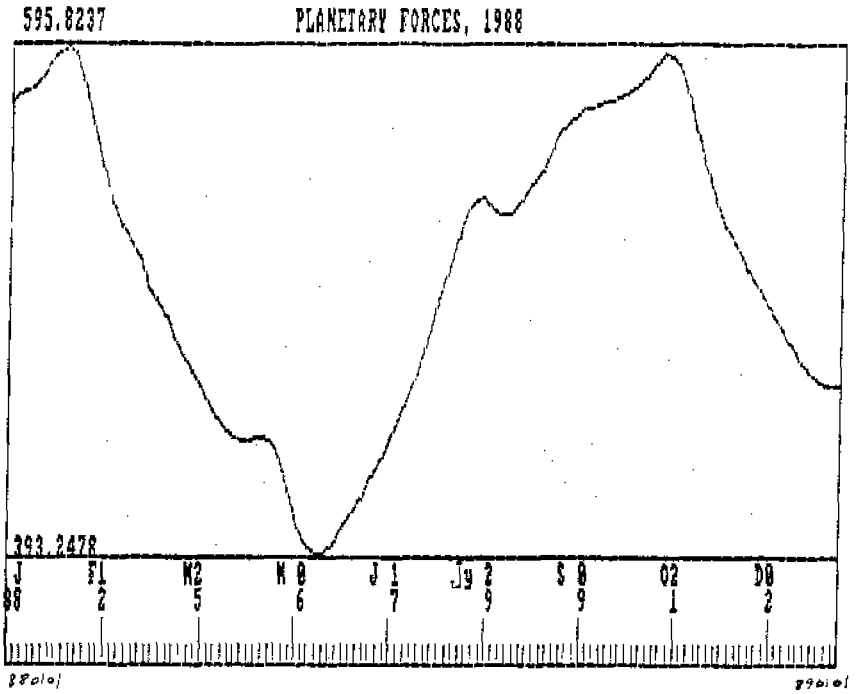


Fig. 1

The 100-Year Market Cycle . . .

At the September meeting of the World Headquarters Chapter, Walter Bressert spoke of the (possible) upcoming bear market as being more like the one of 100 years ago. This, of course, is what Raymond Wheeler concluded in his writings [*Climate, The Key to Understanding Business Cycles*, Michael Zahorchak, editor; page 240]. I would like to see in *Cycles* some discussion of what *did* happen in the late 1800s (and 1700s, too), as well as what might be expected to occur as this century passes through its last decade.

—David Ehmke, Concord, California

Editor's Reply:

Beginning with this issue, we will be reprinting articles from our archives. Raymond Wheeler's writings will be a mainstay of this new section. In addition, Jim Tillman (See page 38) once again illustrates his stock market forecast with the 100-year cycle. In a future issue, we will include an article on long cycles (more than 30 years) in economics and culture.

Geomagnetic Storms Stir the Market . . .

Solar Eagle's letter [December 1988] prompts the suggestion that an explanation for the mechanism linking the Sun, Mercury, Venus, Earth, and Jupiter with a 20-week cycle in major U.S. financial markets might be eruptions on the Sun, which then induce geomagnetic storms on Earth.

A test of geomagnetic storm data, using A_p indices from 1932 to 1986, shows the 20-week cycle to be clearly evident, and while such storms produce variations of only about 0.5% in the Earth's magnetic field of 50,000 gammas, the human brain may couple to environmental magnetic waves of only 30 gamma intensity [*Cycles*, August 1983, p. 159]. So it is plausible that subtly disturbed mental conditions caused by geomagnetic storms could be one of the several major causes of 20-week cyclic behavior in equity, T-bond, and T-bill prices.

The next peak in geomagnetic storm activity, which may produce a peak in irrational behavior, is due near the end of March 1989 according to my work, which, interestingly, tends to support the expected low in the 40.68-month cycle in stock prices forecast [see *Cycles*, December 1988, p. 292].

—Lindsay Walker, Victoria, Australia

Hannula's Planetary Forces . . .

In reference to Dr. Hans Hannula's letter [December 1988], the scale, 0 to 8, of his accompanying chart suggests Hannula adjusted absolute values of planetary force. If so, this was not mentioned in his letter.

Using absolute values of force, as I computed them, and the angular position of each planet, the diagram of vector force that I obtain (see Fig. 1) approximates the shape of the curve in Hannula's chart. However, due to the very large force of Jupiter, the scale is in the hundreds. Also, the "blips" in April and July are not as large as those in the Hannula chart.

As the scale, 0 to 8, of the Hannula chart is so small, it would be interesting to know how he adjusted the force data.

—A. Bruce Johnson, Pensacola, Florida

Berg Replies to Dyer . . .

I'd like to respond to Don Dyer's criticisms [November 1988] concerning an interview I did with *Cycles*. Mr. Dyer claims that I "mouse-trapped *Cycles* into providing free advertising" for me, accusing me of "ploys," "half truths," and "withheld information." He went on to say that it should have been a complete discussion of how the ASTRO Method was calculated.

Firstly, it was an *interview*. It was not intended to be a complete discussion on how to calculate the ASTRO Method. Like most interviews, its intent was to introduce my work, an outline of the method, and what it can do, which is exactly what the interview did.

Secondly, I do not appreciate his accusing *Cycles* of being a "carnival side show." It appears he wants *Cycles* to be another dry scientific journal. *Cycles* is an informal, thematic, discus-

sion-oriented publication, which not only discusses and analyzes new theories, but also does its own cycle research. I applaud *Cycles* for combining scientific analysis with creative, innovative, and informative reading.

As for requesting money for my services, I spent five years developing the ASTRO Method, with much sacrifice, both personal and monetary. I didn't have university backing or government grant money to finance my work, and I didn't ask for it. So I won't make apologies to Mr. Dyer for expecting remuneration for my services. And I'm sure *Cycles* makes no apologies for its journalistic style.

I don't think Mr. Dyer understands the nature of *Cycles* magazine. *Cycles* is the next step up from scientific journals because it deals with practical applications of scientific research. While most scientists are sitting in their ivory towers declaring that the greenhouse effect is inevitable, many other researchers are discovering the real reasons for weather change. And *Cycles* is publishing those kinds of things. My newest research shows how the ASTRO Method can forecast short- and long-term temperature and precipitation.

Now, Mr. Dyer. You showed me some good work on the application of heliocentric latitudes to the ASTRO Method. Submit your work to Cycles, and let's see it. I think it's interesting and deserves more research.

—Larry Berg, editor/publisher
The ASTRO Method,
ASTRO Stock Market Advisory

More Research, Please . . .

Generally, I approve of the new "popular" format of *Cycles*. I imagine that many were quite weary of the old style of giving several pages of cycle statistics on wool production. But I have to wonder if we have now gone too far the other way. A review of the last dozen issues or so show precious little number crunching, and anecdotal speculations seem to be presented as research.

For me, this was illustrated by the November 1988 issue, where my own ox was gored. I wrote an article for *Cycles* [Issue 5, 1979] which found cycles in the votes of the Electoral College and the popular vote for the Senate. I used the standard Systematic Period Reconnaissance method. I had hope that, in subsequent years, someone with much greater formal training and resources would validate and extend the work. No one has. Further, the November issue now tries to predict the election using a composite of four indicators. Granted, they are useful and accurate. Granted, it is hard for a cyclical method to predict the next single point in a series. But the fact does remain that nothing here constitutes cyclical analysis in a recognized sense.

I must begin to wonder about the Foundation's continuing commitment to the original concept that we are here to study cycles, which are fixed length rhythmic repetitions in the values of data, which are discovered and proven via mathematical means. Under the new regime, rigorous research will probably rightly be in the minority, but it should be there regularly. And it should have vigorous Foundation support, and not be dependent strictly on the variable contributions of readers.

—Gary Martin, Bothell, Washington

Editor's Reply:

Thank you for your concerns about the Foundation's commitment to the study of cycles that are discovered and "proven" via mathematical means. But, far from deviating from that pledge, the Foundation has doubled its efforts. Recently, we obtained state-of-the-art computer equipment and have begun the long process of updating all the Foundation's previous work. This updating is being carried out with our CAPII program using the Systematic Period Reconnaissance method. In addition, you will notice in the December 1988 article on the 40.68-month cycle that we included a technical discussion on how the analysis was done, because we are committed to a mathematical approach.

On the other hand, we occasionally run across exciting and valuable data that is not obtained with the CAPII program. The purpose of the Election article was to present some interesting and significant patterns relating to the Election of which our members may not have been aware. The excellent article that you wrote and which the Foundation published laid the groundwork for further research. Hopefully, for the next election, we can update your fine research.

Dr. H.G. Owen writes . . .

Dear Mr. Kokus,

It took over 50 years before Taylor and Wegener's crazy ideas were accepted as hypothesis by the geological and geophysical establishments of our respective countries! There is a slow acceptance that the field evidence does not coincide with the areal predictions of a constant modern-dimensions Earth model. Neither do the data coincide with Carey's fast expansion model (i.e. that the Earth was about 60% of modern dimensions at the beginning of the Jurassic).

In terms of global tectonics, there appear to be a number of interrelated phenomena which produce the crustal configuration and motions we see today. I do not see any other phenomenon than mantle convection to explain the development of the oceanic crust, which is merely the outer chilled anhydrous surface of the mantle itself. There is evidence of marginal subduction in the central and northern Pacific, but the satellite laser ranging results indicate that the displacement of the Americas into the Pacific region, required by the rate of ocean-floor spreading in the passive-marginal oceans, is much less than it should be to comply with the law of conservation of area; obligatory, in the case of a constant-dimensions Earth. There is also the requirement to areal-

ly compensate the rate of spreading from the Pacific Ocean spreading zones. The two sets of figures coincide with the acceleration indicated in my exponential curve in the Atlas [*Atlas of Continental Displacement: 200 Million Years to the Present*, Cambridge University Press, 1983].

The above is the basic crustal growth phenomenon. If one looks at the manner of crustal displacement, yet another interesting fact emerges which is associated with the Earth's rotational history. In general terms, the atmosphere out-accelerates the rotation of the Earth below it; that is, the trend is for the systems to move relatively from west to east. To a lesser degree, the oceanic circulation also responds in a similar manner. The Moon has an attractive effect certainly on the "hydrosphere." In the case of the Earth's continental crust, the break-up of Pangaea and the displacement of the Americas can also be expressed as a very much slower eastward rotational movement of the mantle, causing the acceleration of Eurasia (a large continental area), somewhat faster acceleration eastward of Africa (a mid-sized continent), and comparatively rapid acceleration of Australia partially in response to a relatively clockwise rotation of Antarctica, all away from North and South America and Greenland; the whole pattern being initiated and sustained by global expansion. All of this indicates a highly mobile internal state of the Earth; one which might well respond to the gravitation changes induced by the Moon's rotation.

I think that the problem would be to separate those tectonic motions which can be attributed directly to crustal displacement motions and those which are Earth tidal in origin. It would be difficult to convince people of a lunar attraction cause for earthquakes in the continental/oceanic mobile belts because of the interactive force of ocean-floor spreading and continental displacement, as you fully realise.

Are you in a position to analyse the earthquake data from cratonic areas worldwide? I think that would be the best way of tackling the problem. If you find a global pattern for the cratonic areas, this could be tested against all earthquake data on the one hand and that of the plate marginal mobile zones on the other. Armed with that sort of data, even the most conservative of journals will have to give credence to your results. Detail is certainly the name of the game.

You might be interested to know that efforts are being made to hold a workshop on global tectonic problems at the end of the International Geological Congress in Washington in July next year. It may be one of the liveliest meetings on the subject in twenty years. Whether it will mark a turning point in the study of Earth dynamics remains to be seen. That it is being held at all, is quite significant.

—H.G. Owen

Editor's Note:

Dr. Hugh G. Owen is Director of Palaeontology at the British Museum of Natural History, London. In 1983, he authored the *Atlas of Continental Displacement*, which is the definitive work on past positions of the continents. He has published widely on plate tectonics and palaeontology.

Martin Kokus Replies . . .

I would like to thank Dr. Owen for his encouraging letter. I am heartened by the acceptance, however slow, that the earth's radius may be changing. I am amused that the laser ranging data, which only a year ago was heralded as proof of the conventional theory of plate tectonics, may be the evidence that finally proves earth expansion.

I am intrigued by your notion that the eastward acceleration of the continents is proportional to their area. I suggested the same for different reasons. The potential energy and angular momentum stored in a plate's curvature as the earth expands is proportional to the size of the plate. They are released as the plate approaches isostatic equilibrium, accelerating the plate eastward.

As to your suggestion that I look at earthquakes from cratonic areas, that was my original inclination, but I was sidetracked. It appears that the greatest interest is in earthquakes near the continental margins (i.e. Southern California). My preliminary studies of cratonic areas shows a very close clustering near fortnightly tidal maximums and minimums.

I disagree that the moon and sun's gravity could not affect quakes in the continental/oceanic boundaries. Shaw (1970) has shown that tidal forces may account for up to 10% of the energy driving mantle convection. If the tidal bulges are accelerating and decelerating the earth's rotation, then it should create a horizontal force between plates of different moments of inertia, i.e. oceanic and continental.

We are now at the point where we could predict when a quake is *not* going to happen in fairly large parts of the country (Southern California is not one of them), and this should be useful for planning various construction and mining projects.

—Martin Kokus

Thompson's "Simulated Yields". . .

In Louis M. Thompson's article on lunar cycles and agriculture [December 1988], he uses "simulated yields calculated from weather data" for his database of corn and soyean yields. I wonder why he uses simulated yeilds when, in fact, actual yield numbers widely exist, notably from the U.S. Government from 1866 to the present.

When I charted and looked at the actual yeilds of corn, for instance, the peaks and valleys of corn yields were quite different from his simulated yields, casting doubt on his premise of an 18.6-year and/or a 9.3-year lunar cycle period for crop yields.

In Fig. 3 of his article, he credits an

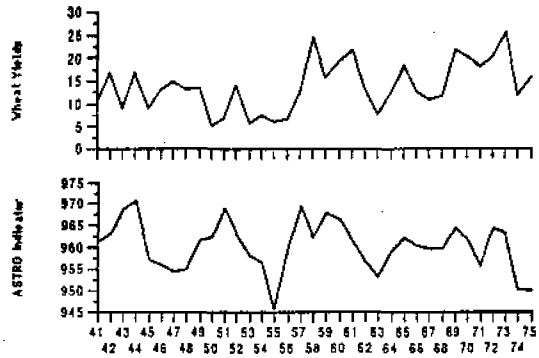


Fig. 2 Wheat Yields, 1941-1975

Top: Oklahoma Wheat Yields (bushels per acre).
Source: "Climatic Change," v2, C.M. Greene.
Bottom: The ASTRO Indicator, 2-year moving average.

18.5-year cycle for being able to forecast yield shortages in 1899, 1936, 1954, and 1973. However, according to yield numbers from the U.S. Government, 1899 was actually a year of above-normal production. And of the 23 remaining "shortage" years, 10 years (43%) were actually above-normal yield years (1878-80, 1897-1900, 1915-16, 1918, and 1937). Thus, the 18.5-year cycle was able to forecast correctly yield shortages only 57% of the time. A 57% average is not indicative of a lunar cyclic relationship.

Here is my own explanation of crop yield variation. The ASTRO Method Indicator (AI) is a composite of planetary angular harmonics. The mechanism involved is this: (1) heliocentric planetary gravitation affects net solar radiation; (2) solar radiation affects Earth atmosphere; (3) atmospheric changes affect the Earth's weather.

When AI is strong, when there are many equal angles occurring between the planets, precipitation is above normal and temperature is below normal. Equating this to crop yields, when AI is strong, crop yields also will be high, due to the abundance of precipitation and absence of intense heat. By way of illustration, Fig. 2 compares AI to wheat yields. Maybe Mr. Thompson can explain more fully his simulated crop yield data. And then maybe he can explain how his simulated yield data is a better indication of crop yield than actual crop yield statistics.

—Larry Berg, Omaha, Nebraska

Master Clock and Market Peak?

In a previous letter to *Cycles* ["In Search of the Cause of the Crash of '87", December 1987], I pointed out the synchronization of the 1929 and the 1987 market peaks with the Master Clock, which is a smoothed version of the solar tidal force exerted by the planets on the sun. This letter will update readers on the current synchronization of the market and the Master Clock, as of January 12, 1989.

As I stated in the earlier letter, the 1929 peak (See Fig. 3) occurred approximately on the *second* peak of the 1.6-year minor cycle within the larger 10-12-year cycle, while the 1987 peak occurred on the *first* 1.6-year minor cycle, which indicates the possibility of a second market peak when that cycle next peaked, in January 1989.

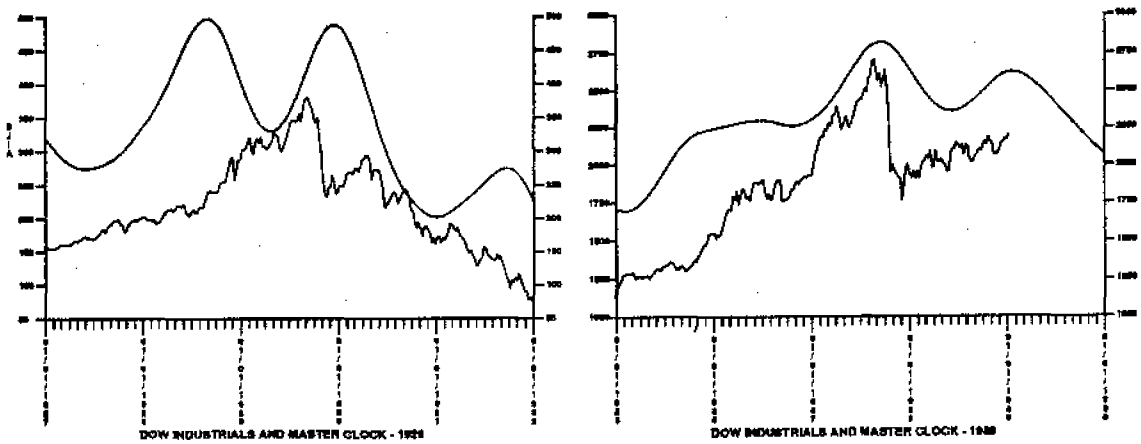
Fig. 4 shows that this is, indeed, what is happening. The market peak in 1987 was a nearly perfect synchronization, and the rally from the crash low seems to be peaking into the current "tick" of the Master Clock. In fact, the general shape of the Master Clock curve and the Dow Industrial curve are even approximately the same! However, this is not always true, so the current correlation of direction and market trend should not be relied upon unless supported by other analysis. My other analysis indicates that the rebound rally is peaking, so I would expect this Master Clock "tick" (January 20, 1989) to mark the end of the bear market rally, and the resumption of the downtrend.

—Hans Hannula, Northglenn, Colorado

Editor's Note:
The Master Clock is available as part of the Foundation's data series. Cost is $40 each (disk or printout) plus $3 for shipping and handling.

Fig. 3 (left)
Dow Industrials and Master Clock, 1929

Fig. 4 (right)
Dow Industrials and Master Clock, 1989



analysts appear to be quite dated by the time I receive my copy of the magazine.

For example, I received the July/August issue [about 12 days after it was mailed]. In this issue, the spread in dates between the most recent analyst's comments and the earliest comments is about a month, and the "average" comment is about 7 weeks old. Considering that the ordinary market analysis is of an intermediate-term nature and may have relevancy for only about a month or so, market comments that are already 7 weeks old are of little benefit to the reader.

If the Cycle Analysts Review section is to serve its presumed purpose—to provide timely market advice for investors—every effort should be made to include the current analysis of each commentator. I do hope you will be able to move in this direction.

—F.O., Langley, Washington

Editor's Reply: We are keenly aware of the desirability of providing timely material in the Cycle Analyst's Review. We excerpt intermediate- to longer term comments from the newsletters, when possible. In that vein, if the intermediate term is accurate, the reader can watch the longer term comments closer. To aid this approach, when it is possible, "milepost" support or resistance levels or specific price projections are given.

However, not all newsletter writers provide information that is readily transformable into the time and space constraints that exist. In addition, our magazine deadlines do not necessarily coincide with newsletter writers' publication dates. And, to further add to the delay, the magazine is mailed with second-class postage to keep costs down to reasonable levels. But we continually strive to make changes within our control to keep the material timely. Hopefully, you will see a change for the better beginning with this issue.

Wheat prices to peak in 1991 . . ?

Major and minor cycles and lows and highs can be used to illustrate where wheat prices have been, and to project wheat prices into the future. The major cycles in wheat are 11, 18, 37, and 54 years. The minor cycles are 3, 4.7, and 9.31 years.

Following are the lows in wheat prices since 1620: 1620, 1631, 1646, 1655, 1665, 1685, 1707, 1732, 1742, 1760, 1779, 1821, 1835, 1851, 1895, 1932, 1961, 1966, 1972, and 1986. Following are the highs: 1622, 1635, 1661, 1672, 1696, 1709, 1756, 1800, 1811, 1839, 1855, 1920, 1937, 1948, 1973, 1980, 1991(?).

A major low in recent times occurred in 1932. On December 16 of that year, wheat December futures fell to 38 cents a bushel on the Winnipeg Commodity Exchange, which traded world wheat futures then. The next high occurred 4.7 years later on July 17, 1937, when prices reached $1.57 per bushel in July futures—an increase in value of 4.13 times the December futures.

In 1986, 54 years later, the Chicago Board of Trade recorded a low of $2.42 per bushel in July futures on June 16. If you add 4.7 years, as from 1932, wheat prices should make a high in 1991. Using the same increase in value as in 1932, the 1991 wheat prices could make historic highs: 1937 + 54 years = 1991; 1973 + 18 years = 1991; and 1980 + 11 years = 1991.

—Douglas Stanger, Munson, Alberta, Canada

Editor's note: This article is reprinted from Grain News, *published in Winnipeg, Manitoba, Canada. Stanger, who is a grain grower and hedger, is also a member of the Foundation's International Advisory Board.*

The 18.5- or 18.6-year cycle in agriculture . . .

In a recent series of articles in *Cycles*, Louis M. Thompson has been examining a time series of simulated corn yields in Iowa and Illinois from 1890 to 1983. The simulation aspect arises from an attempt to "level the field" with respect to the production technology. His basic thesis appears to be that the dominant cycle is a weather cycle of 18.5 years, and that the appropriate lunar cycle to be examined as a possible cause is the lunar nodical cycle of 18.6 years.

While watching my computer rummage through an analysis of Mayan cycles, I observed a cycle of almost exactly 18.5 years, for which the following "provocative" relations apply.

18.5 years =

- 217.250 LT–V synods
- 198.749 L–V synods
- 217.249 LS–V synods
- 152.008 L–M synods
- 171.502 LD–M synods
- 170.508 LS–M synods
- 170.508 LT–M synods

(L = lunation; LD = lunar draconic; LS = lunar sidereal; LT = lunar tropical; M = Mercury; V = Venus)

Multiplying all of the above numbers of synods by four will give very good approximations of integers at a 74-year cycle, and will agree with the basic 74-year cycle of Samuel Benner.

Perhaps these calculations will help relieve Dr. Thompson of the nagging discrepancy between 18.5 and 18.6 years and let him resolutely use 18.5000 years for his cycle. They should also preserve his observations about the moon riding high and low in connection with various crop years. This suggests that the moon's position with respect to the earth's projected equator, rathern than to the ecliptic, is important in the weather cycle. (Note: The *Old Farmer's Almanac* faithfully lists the dates when the moon rides high and low and crosses the equator, but only notes the ascending and descending nodes. It also notes the dates when Venus is geocentrically synodic with the moon.)

To the Mayans, the importance of Venus in terrestrial agriculture and earthquakes was so great that they used a zodiac of thirteen signs. Since they used only integer mathematics, they rounded the LS-V synodic to 28 days and used a 364-day computational cycle, adjusting as needed. Most authors have no explanation for the 364-day cycle.

—The Solar Eagle

The stock market's strength . . .

The exponential blowoff in the markets is beginning to resemble 1987 and 1929 more and more every day. It does look like we are making a fine

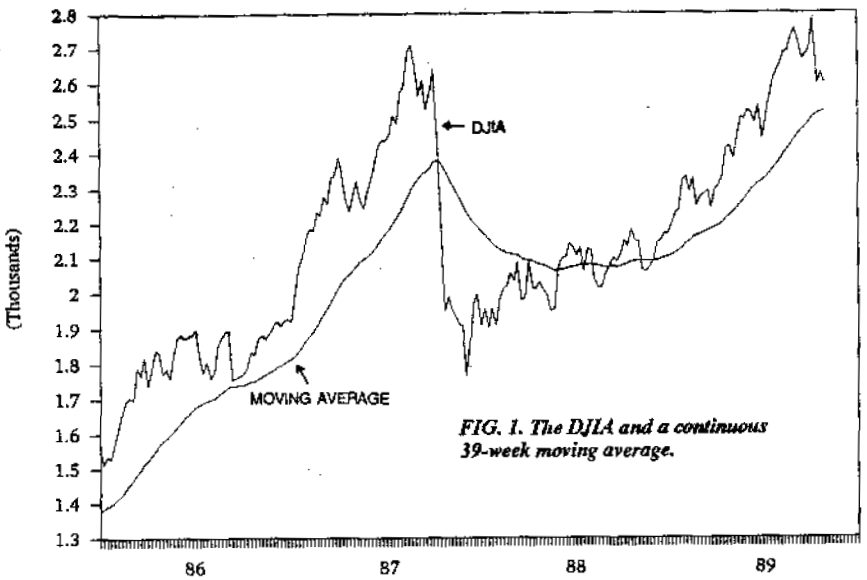


FIG. 1. The DJIA and a continuous 39-week moving average.

entry and whipsaws, employ other indicators for a buy signal; then reset the moving average to the market low experienced at the time. The resultant moving average will be discontinuous, as can be seen in Figure 2 (September 1986 and May 1987). An exponential 39-week moving average (MAV) was calculated, using this formula:

THIS WEEK'S MAV =
LAST WEEK'S MAV x 0.95
+ THIS WEEK'S VALUE x 0.05

The MAV is reset by using the present price as the MAV at the time of the buy signal. Premature buy signals will result in some whipsawing; but once the real bottom occurs, no further false sell signals will be given. Special attention should be given to significant lows that will occur in even years, when the 2-year cycle bottoms.

The most serious problem with use of the MAV is the lateness of a sell signal. In times of accelerated upward market movement, the sell indication gives back too much profit. Also, unless it is monitored on a daily basis, the signal may not be given in time to exit the market prior to a crash such as occurred in 1929 or 1987.

The solution is to create an additional sell indicator whenever the DJIA exceeds the reset MAV by 16%. I call this a "Ratcheted Indicator" (RI), because I always use the highest percentage experienced. To calculate the RI, use this formula:

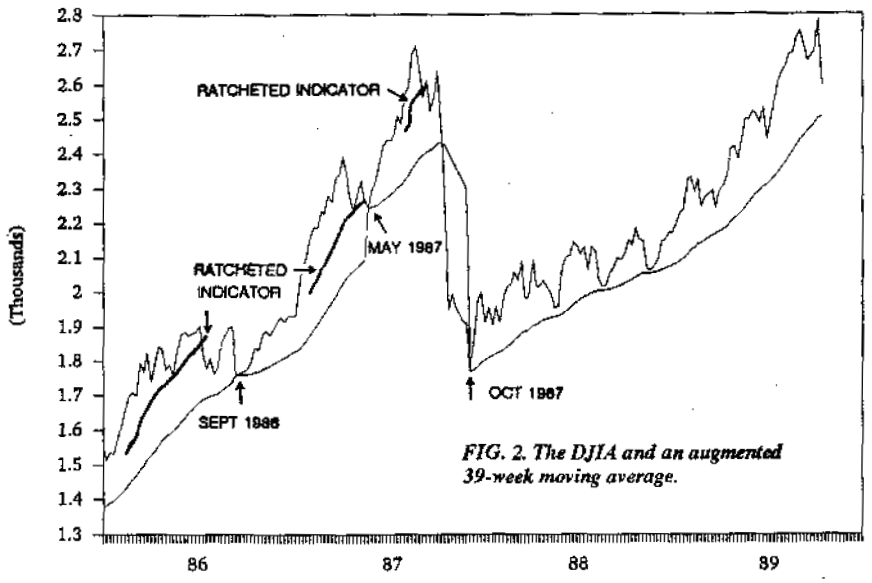


FIG. 2. The DJIA and an augmented 39-week moving average.

RATCHETED INDICATOR =
MAV x (1 + 1/2 RATCHETED %)

This RI will give an early sell signal during a topping process, but very little is given up in the way of profit.

When the market is in a period of very high acceleration, the RI can give a sell signal followed by a buy signal, where the MAV is reset upward. In that case, continue to compute the unreset MAV as well as the reset MAV. If the price exceeds the unreset MAV by 16%, compute a new RI (using the unreset MAV) to be used as a sell indicator. This occurred in May 1987 prior to the 1987 crash (Figure 2).

The techniques described above were back-tested using data from 1950 to the present, and proved to be reliable. An unexpected benefit was that most of the profitable moves were long term and may have qualified for long-term gains. A benefit for the not-so-avid investor is that, once a buy signal has been executed, all the computations can be made once a week in just a few minutes.

The discontinuous moving average is a new concept, as far as I know, and it may have other applications of value. The Ratcheted Indicator is similar to, but not the same as, the Bollinger Band Indicator.

—Gordon Suiter, Tustin, California

Planetary harmonics, financial indices, and weather . . .

I have found a similarity between planetary harmonics [*Cycles*, January/February 1988] and percent-of-change of money supply, employment, and the stock market. I believe that planetary angles affect earth's weather, which then affects human behavior and psychology, as represented by these financial indices. Future planetary harmonics indicate a strong stock market, low employment, and high money supply in 1990, 1994, and 1995 (Figure 3).

I have also found correlation between planetary harmonics and U.S. temperature (Figure 4) and precipitation. When planetary symmetry is low, temperature is high (the symmetry curve has been inverted) and precipitation is low. The ASTRO Indicator correctly forecasted the drought years

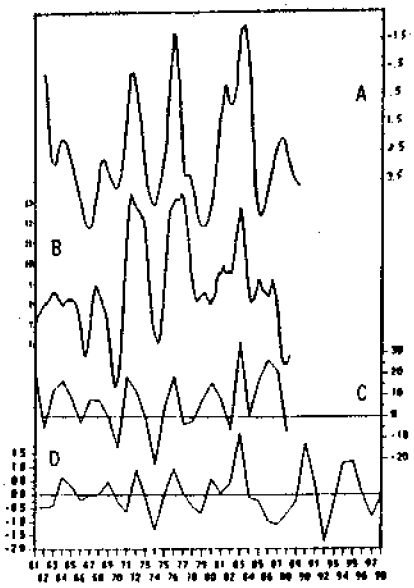


FIG. 3. Correlation of planetary harmonics with financial indices. A: Employment payroll (inverted), 12-month percent of change, lagged 6 months. (Cycles, March/April 1989.) B: Money Supply, M2, 12-month percent of change. (Cycles, March/April 1989).C: S&P 500 stocks, yearly percent of change of yearly average. (Federal Reserve Statistics). D: The ASTRO Indicator, yearly percent of change of a smoothed 2-year moving average.

of the early 1930s, 1950s, 1960s, and mid-1970s, as well as the 1988 drought. Planetary harmonics forecasts 1989 and 1990 as cooler and wetter than 1988—which, so far, is correct—with another dry, warm spell in 1992 before turning cool and wet again into 1995.

—Larry Berg, Omaha, Nebraska

Curiouser and curiouser . . .

In his recent article on cycle analysis validation by backcasting (*Cycles*, July/August 1989), Anthony F. Herbst lists twenty cycles derived from the S&P 500 Index using the CAP III program. A question that came to mind was what, if any, was the harmonic relationship between the various cycle periods. Table 1 shows the method and results of a search for existing harmonic relationships.

Column A lists the ratio derived from dividing the longest period (394) by each of the other periods in turn. Curiously, the resulting ratios are amazingly close to integers, half integers, quarter integers, or tenths of integers. Only period #11 is notably inconsistent with the others.

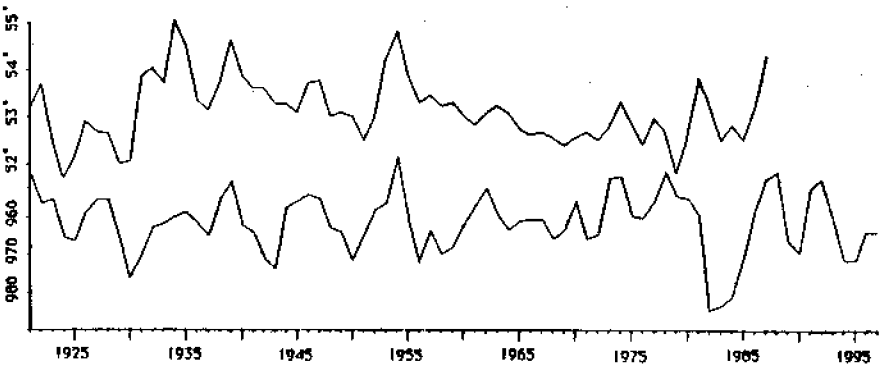


FIG. 4. U.S. temperature compared to planetary symmetry. TOP: Annual U.S. temperature, 2-year moving average. (From Historical Climatology Series 4-1, National Climatic Data Center, Asheville, NC. BOTTOM: Annual planetary symmetry indicator, smoothed 2-year moving average. (From Cycles, January/February 1988).

Then the ratios are rounded off (Column B), and the rounded numbers divided into the original ratios (Column C). The inconsistency of period #11 is even more obvious. Note that periods #10, #12-#14, and #16-#20 are less than one order of magnitude away from those where the decimal point is followed by six zeros or six nines. Even without the fancy probability calculations to support the case, these results cannot be characteristic of the output of a random walk or purely chance driven system.

Column D shows the value of each period as calculated from 394 market days, divided by the rounded-off number in Column B. Again, period #11 is inconsistent, whereas all the other periods round off to their original values.

If the given periods in market days are multiplied by 7/5, their values in mean solar days (MSD) are obtained (Column E). These numbers are the starting point in a search for the underlying cosmological (astrophysical) forcing cycles. For instance, several of these cycles can be precisely calculated as harmonics of the synodic period of the lunar draconic cycle and the period of Mercury.

—The Solar Eagle

Table 1.

Herbst S&P 500 Cash Index — Selected Cycles

P#	PERIOD (market days)	Col. A (394÷Pn)	Col. B (A rounded)	Col. C (A÷B)	Col. D (394÷B)	Col. E Period (MSD)
1	394.0000	1	1	1	394.0000	551.600
2	207.3684	1.900000	1.9	1.000000	207.3684	290.316
3	131.3333	3.000001	3	1.000000	131.3333	183.867
4	96.0976	4.099998	4.1	.9999996	96.09756	134.537
5	71.6364	5.499997	5.5	.9999995	71.63636	100.291
6	70.3571	5.600003	5.6	1.000001	70.35714	98.4999
7	56.2857	7.000002	7	1.000000	56.28571	78.8000
8	42.8261	9.199997	9.2	.9999997	42.82609	59.9565
9	30.3077	13.00000	3	.9999997	30.30769	42.4308
10	28.6545	13.75002	13.75	1.000002	28.65455	40.1163
11	26.2443	15.01278	15	1.000852*	26.26667	36.7420
12	25.4194	15.49997	15.5	.9999982	25.41935	35.5872
13	23.1765	16.99998	17	.9999987	23.17647	32.4471
14	20.736s	19.00004	19	1.000002	20.73684	29.0315
15	15.9192	24.74999	24.75	.9999995	15.91919	22.2869
16	14.0714	28.00006	28	1.000002	14.07143	19.7000
17	13.5862	29.00001	29	1.000001	13.58621	19.0207
18	9.4371	41.75011	41.75	1.000003	9.437126	13.2119
19	8.9545	44.00022	44	1.000005	8.954545	12.5363
20	8.7556	44.99977	45	.9999949	8.755556	12.2578

** Not consistent with the other periods chosen.*